PART XI.

ABDOMINAL VISCERA,

TOGETHER WITH

THE MALE AND FEMALE ORGANS OF GENERATION.

A

SYSTEM

OF

ANATOMICAL PLATES;

ACCOMPANIED WITH DESCRIPTIONS

AND

PHYSIOLOGICAL, PATHOLOGICAL, AND SURGICAL

OBSERVATIONS.

BY

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MY DEAR SIR,

IN dedicating this Part to you, it affords me inexpressible satisfaction in having the present opportunity of publicly acknowledging my gratitude for the many acts of friendship which I have received from you, and particularly to express my thanks for the use of your valuable collection of preparations to make the drawings of the Gravid Uterus.

Believe me ever to be,

My DEAR SIR,

Yours most faithfully,

JOHN LIZARS.

To Dr. WILLIAM CAMPBELL,
Lecturer on Midwifery, Edinburgh.

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THE ORGANS

OF

MASTICATION AND DEGLUTITION.

The organs in the thoracic cavity have been already described in Part II., from page 1 to 17; the reader, therefore, has only to apply the letters and digits therein marked, to Plates XIV. and XV. of Part X., to enable him to understand their application to these figures, and also to Plates I., II., III., and IV., of Part II.; but should he find any difficulty or obscurity, he must consult at the same time the index of the letters of reference to Plates XIV. and XV. of Part X.

Before proceeding to the examination of the abdominal viscera, it is requisite to advert to the organs of mastication and deglutition, the description of the greater number of which have been given in Part I. page 62, and Part IX. pages 15 and 58, as the mouth, the teeth, the gums, the mucous membrane of the mouth, the labial, the buccal, and the palatine glands, the fauces, and the pharynx, together with their various muscles; only the larger series of salivary glands,* therefore, remain to be described, as the parotid, the submaxillary, the sublingual, and the molar.

* Syn. Glandulæ salivares orales.

The parotid gland,* the largest of the salivary glands, is situated immediately anterior or glabellar to the external cartilage of the ear, extending from the zygoma downwards, a little beyond the angle of the inferior maxillary bone, and across the face, nearly one-third from the tragus to the angle of the mouth, or ala of the nose, resting on the masseter muscle, and converging to a point, from which its duct x proceeds imbedded in the adipose substance of the cheek, to pierce the buccinator muscle and mucous membrane of the mouth, in an oblique manner, opposite the second molar tooth of the upper jaw. The parotid gland is represented in Plate X. of Part II., marked s, its duct being indicated with the letter x. This gland, enveloped by a strong fascia, resembling that which invests the muscles and vessels of the neck, and appearing continuous with it, is partially covered by the platysma myoides muscle F; it is a conglomerate gland, or consists of a number of lesser glands, or lobules, of a pale reddish colour, agglutinated together by cellular membrane, from which proceed the smaller ducts that concentrate to form the larger duct x.† In the substance of this gland are imbedded the facial nerve, the temporal artery, and vein.‡ The parotid duct is a large excretory tube of a bluish white colour, remarkably thick in its substance, which is cellular, thus reducing the calibre of the canal, whose investment is serous. Where the duct pierces the mucous membrane of the mouth, it runs obliquely so as to act as a valve. In the living state,

* Syn. Superior maxillary gland. † Syn. Steno's duct: Ductus superior.

‡ The relations of this gland to these important blood-vessels and nerves should be considered by the general practitioner, and also the operator. The parotid, like other glands, is subject to inflammation, constituting cynanche parotidea, to scirrhus, cancer, and the various modifications of sarcoma, some of which require the knife to eradicate them.

a small elevation of a ruddy colour is observable where the duct enters the mouth. The parotid gland should be examined by the student when dissecting the blood-vessels, nerves, and muscles of the face.

Occasionally one or two smaller salivary glands are found, either at the commencement or in the course of the parotid duct, the ducts of which join the parotid. These glands are named socia parotidis, or glandulæ accessoriæ. Lymphatic glands are always found in the vicinity of the parotid gland.*

The submaxillary or inferior maxillary gland, one of the conglomerate class, delineated in Plate IX. of Part II., marked with the letters *n*, is situated under, or centrad and basilad of the angle of the inferior maxillary bone, having the facial artery *c* imbedded in or surrounded by its lobes, of which there are two or more. This gland is obscured completely by the platysma myoides muscle, and rests on the digastric and stylo-hyoideus muscles w. From its lobes small ducts proceed to form a larger one,† which runs between the mylo-hyoideus muscle *m*, and the lining mucous membrane of the mouth, apparently piercing the sublingual gland, marked 80 in Plate VII. of Part II., and entering the mouth by piercing its mucous membrane close to the side of the frænum linguæ, where a small papilla is observable, and where the entrance of the duct of the opposite side touches this papilla. The submaxillary duct does not pierce the sublingual gland, but runs between the gland and the side of the tongue, in a slightly waved manner, and is indicated by a bristle inserted in it, in Plate VII. of Part II. This duct is much more delicate and capacious than the paro-

* These lymphatic glands frequently involve the parotid in their diseased actions.

† Syn. Ductus inferior: Ductus Whartoni.

tid, being with difficulty distinguished from a vein which accompanies it; it is of a greyish colour, and consists externally of cellular fibres, and internally of a mucous membrane.*

One or more lymphatic glands are generally situated near the submaxillary gland.

The sublingual, another conglomerate gland, of an oblong figure, marked 80 in Plate VII. of Part II., is situated beneath the tongue, between the mylo-hyoideus muscle *m*, and the inferior surface or base of the tongue, with its extremities pointing to the apex and root of this organ, and having a considerable extent of its surface invested with the lining mucous membrane of the mouth. It is the smallest of the preceding salivary glands, and consists of more lobules, which are also softer. Several short ducts proceed from this gland, which pierce the mucous membrane of the mouth in the contiguity of the submaxillary duct, and are best exemplified in the living state, appearing then small papillæ. A distinct duct is described by some authors to proceed from this gland, and to join the submaxillary duct; but this I have never observed.

A molar gland, intermediate in size to these larger glands and the smaller described in Part IX. page 59, is described as being situated between the anterior margin of the masseter muscle and the outer aspect of the buccinator muscle, opposite the dentes molares of the

* The relation of the submaxillary gland and its duct to the contiguous objects should be well considered by the general practitioner and the operator, as this gland, like the parotid, is subject to the same diseases, and the lymphatic glands in its vicinity not unfrequently so involve the submaxillary, that the one cannot be removed by the knife without the other, a circumstance which has occurred to myself. The submaxillary duct is subject to obstruction and over-distension with its salivary fluid, constituting ramula; and calcareous concretions are not unfrequently deposited in this duct, requiring extirpation.

upper jaw, but I have never found any glandular body situated here; several small glandular bodies are found between the buccinator muscle and the mucous membrane of the mouth, opposite this region; but these are, strictly speaking, the buccal glands.

The labial, the buccal, the lingual, the palatine, and the pharyngeal glands, which have been described in Part IX., are conglobate glands, having single ducts or lacunæ piercing the mucous membrane of the mouth.

VISCERA OF THE ABDOMEN.

The abdominal viscera are represented in their natural situation in Plate I. of Part II., and Plates XIV. and XV. of Part X.; Plate I. of Part II. illustrating an anterior or sternal view, Plate XIV. a lateral one, and Plate XV. of Part X. a posterior or dorsal view.

The abdominal cavity is bounded superiorly or atlantad by the diaphragm, marked B in Plate I. of Part II., and Plates XIV. and XV. of Part X.; inferiorly or sacrad by the brim of the pelvis, delineated in Part I. Plate III. letter *y*, or by the *cul de sac* formed by the peritoneum a, extending between the bladder m and the rectum I, as represented in Plate XIV. of Part X. assisted by these viscera, together with the levator ani muscle, and the bones forming the outlet of the pelvis, according as the pelvic cavity is considered excluded or included in the abdominal; anteriorly or sternad by the integuments and abdominal muscles, as the recti and pyramidales, together with the tendinous expansions of the three lateral, as depicted in Part IV. Plates I. II. and III.; posteriorly or dorsad by the spinal column, together with the crura of the diaphragm, the psoæ and quadrati lum-

borum muscles, as represented in Plate IV. of Part IV.; and laterally by the false ribs, the ossa ilium, and lateral muscles of the abdomen and integuments, as delineated in Plates I. II. and III. of Part IV.*

The interior of this extensive surface is invested with a serous membrane, named the peritoneum, which is also reflected on all the abdominal viscera in a similar manner to the pleura, so that these organs are equivocally said to be without this membrane. It forms a perfect sac in the male, but is continuous with the mucous membrane of the Fallopian tubes in the female. The simplest method of investigating the peritoneum is to make first a transverse division of the abdominal parietes a little below the umbilicus, and then a perpendicular one in the linea alba from the centre of this transverse one to the symphysis pubis, and reflect these two flaps outwards. The small intestines must now be held upwards towards the diaphragm, and the peritoneum, a, may then be traced from the region of the umbilicus, sinistrad, laterad, and dorsad, to the sigmoid flexure z of the colon, over which intestine it next glides to the brim of the pelvis, extending around dorsad and dextrad to the caput cœcum coli M, over which portion of the same intestine it runs, to ascend on the abdominal parietes onwards to the region of the umbilicus, from whence we commenced. The peritoneum thus forms a continuous glazed serous surface, never passing behind any of the viscera; and will be easily comprehended, by supposing the simple experiment of making a small puncture in the abdominal parietes of a sound abdomen, and pouring or injecting into the cavity a mixture of Paris plaister and water, which is to be immediately removed.

* The physiologist should attend to these boundaries of the abdomen, to enable him to reason on respiration; and the surgeon, that he may comprehend the causes of hernia.

On opening this abdominal cavity, we should find every point of its surface, whether parietes or viscera, coated with the white pigment, which would precisely resemble the peritoneum.

Having investigated and understood this course of the peritoneum, we should next examine its structure, deferring the manipulation of its productions or processes until we come to investigate the viscera to which they belong. The flaps may be selected for the minute structure; and as the peritoneum in this region is concerned in hernia, and the securing of the external iliac artery, it ought to be carefully examined. The surface, which looks centrad or towards the cavity, is serous; while that which adheres to the abdominal muscles is cellular, the latter of which is best elucidated by tearing with the fingers the membrane from these muscles. In doing this we should attend to where it adheres firmly, which will be found to be particularly the case from the angle of the flap down to the line, immediately opposite Poupart's ligament. It adheres loosely at the linea alba, intimately to the tendon of the transversalis, and loosely again to the fleshy fibres of this muscle. In thus tearing the peritoneum from its connexions, it appears in some points much stronger than in others, in general where it admits of any extension, as near the urinary bladder; for according as this viscus is distended with urine, does it carry the peritoneum along with it: hence it is a very extensible membrane. The peritoneum is supplied with nerves from the various nerves in its contiguity, as the phrenic, the lumbar, and the great intercostal; but it does not appear to be peculiarly sensitive in the living state while in health, although it becomes exceedingly so in disease. This membrane is also supplied by numerous arteries, as the phrenic, the lumbar, the cœliac, the superior and

inferior mesenteric; it is not apparently very vascular in the living state during health, but becomes remarkably so in inflammation.

Properly speaking, before investigating the peritoneum even in the most superficial manner, we ought to examine the natural and relative situation of the abdominal viscera, in order to make ourselves acquainted with their situation when diseased. To facilitate this, the abdominal cavity is divided into the following regions, the epigastric, the umbilical, and the hypogastric or pubic, with their respective lateral ones; thus the epigastric has its hypochondriac regions, the umbilical its renal or lumbar regions, and the hypogastric its iliac or inguinal regions. To define the three chief regions, two parallel straight lines are drawn from the anterior superior spinous processes of the ossa ilium upwards on each side until they meet with one drawn at right angles, across from the upper or atlantal point of the ensiform cartilage, which space is divided by drawing other two straight lines at right angles to the preceding two, the one intermediate between the sacral apex of the ensiform cartilage and the umbilicus, which limits the epigastric region; the other extending across at equal distances between the umbilicus and the symphysis pubis, in order to indicate the umbilical and hypogastric regions; the former of which is, therefore, situated at equal distances between the ensiform cartilage and the symphysis pubis between the middle lines, and the latter between the lower or pubic of these two lines and the symphysis pubis. Those portions of the abdominal cavity which are on each side of the epigastric, are named the hypochondriac regions, and are bounded by carrying the straight line between the ensiform cartilage and the umbilicus completely around to the spinous processes of the spinal column, also the one from

the atlantal point of the ensiform cartilage across to the same processes of the spine. In a similar manner the two lateral regions of the umbilical are defined, and are named the renal or lumbar regions; and so also with the iliac or inguinal in regard to the hypogastric. Another method, which is probably the simpler, is to draw in the first instance the transverse lines from the ensiform cartilage,—from the intermediate point between this and the umbilicus,—from the intermediate point between the latter and the symphysis pubis,—and from the crista of the os pubis round to the spinal column, thus defining the three chief regions with their respective lateral ones at once; and then to subdivide each of these three into other three, by drawing the longitudinal straight lines from the spinous processes of the ossa ilium upwards. The space immediately centrad to the ensiform cartilage is termed the scrobiculus cordis. Monro primus, feeling the want of definite perspicuity in these regions, makes a tenth, which he names the lumbar, and defines,—"is the posterior part of the abdomen, and comprehends all that space which reaches from the lowest ribs on each side, and the last vertebra of the back, to the os sacrum and neighbouring parts of the ossa ilium. The lateral parts of this region are termed the loins." It must be confessed, that even with all these divisions, a great difficulty exists, particularly in morbid anatomy, to describe with accuracy the precise situation of any viscus. Thus, for example, the natural situation of the spleen is in the left hypochondriac region, and in morbid states it occasionally projects into the epigastric, the umbilical, the left renal, and left iliac regions; but these not having been hitherto so definitely marked, a difficulty existed of telling exactly what was epigastric, renal, or iliac region. I have been led to make these

remarks, and to point out with more perspicuity these regions than has been hitherto done, from a judicious suggestion of Dr. Duncan, Professor of Materia Medica in the University of Edinburgh.

When the anterior abdominal parietes are reflected aside, as in Plate I. of Part II., (in doing which, the student must attend to the preservation of the round ligament of the liver g, by making his incision on the left side of the linea alba from the umbilicus to the ensiform cartilage,) we observe the omentum majus h, obscuring nearly all the other viscera, which is the case when it is healthy; we however always perceive a portion of the stomach b situated atlantad to it, with part of the liver i still more atlantad and dextro-laterad, projecting from under the ribs; and inferiorly or sacro-pubic to the omentum h, the uterus k, and the urinary bladder m; the latter organs, however, are only seen in some female subjects, for in the majority of females they are covered by the omentum, and the same is the case in males with regard to the urinary bladder. On cautiously reflecting the omentum majus upwards on the stomach, liver, and ribs, we bring into view one of the large intestines, the colon marked M, O, P, in Plate IV. of Part II., and T in Plate XIV. of Part X., encircling the greater proportion of the small intestines marked K and L, the letter K indicating the jejunum and L the ileum.

On elevating the margin of the liver i, we see the omentum minus stretched between the stomach b, and the liver, with the gall bladder e on the concave aspect of the latter; on raising gently the stomach b, we perceive the spleen F, and the duodenum c; on feeling beneath or dorsad to the omentum minus, or rather on feeling through this delicate web, we touch the pancreas, marked D in Plate IV. of Part II.; on feeling beneath or

dorsad to the colon, immediately sacrad to the liver i, we find the kidneys, marked Y in Plate V. of Part II. and in Plate XV. of Part X. These are the different viscera found in the abdominal cavity, which are divided into the floating and fixed, or the chylopoietic and assistant chylopoietic viscera. In the abdominal cavity then are contained, the peritoneum, with its productions, the floating and fixed viscera, with their appendages, blood-vessels, nerves, and absorbents. The productions of the peritoneum are the omentum majus, the omentum minus, the mesentery, the mesocolon, the mesorectum, the ligaments of the liver and of the spleen. Under the floating viscera are comprehended the stomach, the small and large intestines; and under the fixed viscera, the liver, with the gall bladder, the pancreas, the spleen, and the kidneys. When we apply the term chylopoietic, we comprehend the stomach, the small and large intestines, together with the omentum majus and minus, the mesentery, mesocolon, and mesorectum. Under the assistant chylopoietic viscera, are comprehended the liver, the pancreas, and the spleen. The kidneys in this latter arrangement come under the organs of urine. I have intentionally left out the pelvic viscera, for the sake of simplicity. The nerves and blood-vessels have been already considered in Part II.

I shall now proceed to the description of the individual viscera, which I shall give in a connected order, and not in that which the student should adopt.*

* The student should proceed as follows: first, he ought to inflate the colon from the ileum, within six inches or so of the former; secondly, inflate the stomach and duodenum from the jejunum, within two or three inches of the duodenum, attending carefully to the course of the duodenum during his inflation; thirdly, inflate the jejunum and ileum either from where the aperture was made to inflate the stomach, or from that to distend the colon. Having made himself master of all

The omentum minus and majus are productions of the peritoneum. On tracing with the finger the glazed con-

the connexions of these viscera, and their natural and relative positions, together with the mesentery and mesocolon, he should examine the omentum majus and minus; next collapse the jejunum and ileum, and investigate the superior and inferior mesenteric arteries, with the nervous mesh on these vessels; thirdly, he ought to manipulate the colon, gradually and progressively removing it, by beginning at the caput cœcum, taking along with it the few inches of ileum, and cutting close to the intestine, so as to leave the mesocolon, and ending at the rectum. The structure of the colon, with its valve, &c. require to be deliberately investigated. Let him again return to the other viscera in the abdominal cavity, and proceed with the examination of the jejunum and ileum, the nerves, arteries, and veins of which having seen, and rudely traced, let him detach these intestines in the same way as he did the colon, cutting the mesentery close to the intestine, at which period he will comprehend the manner of the reflection of the peritoneal tunic over the intestine better than any other, also the course of the arteries, veins, and lymphatics, the last of which, however, are seldom discernible. When he has removed these intestines, he must examine most carefully their structure. He should now return to the abdominal cavity, and commence the minute examination of the liver and gall bladder, with their ducts, the duodenum, the stomach, the pancreas, and the spleen, together with the nervous mesh distributed on their blood-vessels, and these vessels themselves; also the formation of the vena portæ, by the gastric, the superior mesenteric, the inferior mesenteric, and splenic veins; and having satisfied himself of their situation, connexion, and relation to each other, let him remove, in a mass, the liver, the duodenum, the pancreas, the spleen, together with the veins forming the vena portæ, but leaving their respective arteries as long as possible. When insulating the liver, he must remove a portion of the vena cava ascendens, by dividing it immediately atlantad to the renal veins, and also atlantad to the liver itself, thus taking away that part of it which is connected with the liver. Having detached these viscera, which is rather a difficult task, he should investigate them most minutely. The stomach has been left, in order to witness the distribution of the nervi vagi, which will have been by this time traced by the gentleman occupied in dissecting the neck and thorax. If this has been done, the stomach should be also removed, and be likewise thoroughly investigated, having previously, however, examined the arteries proceeding to it, as also the veins returning from it; this mode of proceeding should invariably be attended to, for when once the viscera are removed, the blood-vessels are with difficulty understood. The student should now proceed to trace the distribution of the splanchnic nerves, and the trunks of the great intercostals, which, by this period, will have been dissected by the young gentleman engaged in investigating the neck and thorax. After the examination of the nervous system, he should proceed with that of the arterial, and having advanced to the renal artery, he should

cave surface of the liver i, in Plate I. of Part II., to the gastric p and hepatic q vessels, we find this glazing, which is the peritoneal tunic of the liver, become a loose web, apparently cribriform, and stretching to the duodenum and the concave lesser arch of the stomach b. This loose delicate web is joined by another lamina from the dorsal aspect of the liver, as will be readily comprehended by examining Plate XV. of Part X., which also advances to the concave lesser arch of the stomach, and this double cribriform web constitutes the omentum minus.* The omentum minus is thus bounded by the concave aspect of the liver, by the ducts and vessels extending between the latter and the duodenum, by that portion of the duodenum between these ducts and vessels and the stomach, and by the concave arch of the stomach and the œsophagus to the diaphragm.

The peritoneal tunic now embraces the stomach b, and contiguous portion of the duodenum, so as to invest both their surfaces, their sternal and dorsal, advancing to the greater convex arch of the stomach, and contiguous portion of the duodenum, where the two portions meet and become again a loose floating web, marked h, named the omentum majus,† which extends to the uterus k, where it is reflected inwards and backwards, or centrad and dor-

manipulate the kidney with its duct, the ureter, the latter of which he ought to inflate a few inches from the kidney, both upwards to see the relation of the pelvis to the blood-vessels, and downwards to witness its connexion with the urinary bladder. He may now remove the kidney, with its artery, vein, and ureter of some length, and investigate it minutely. The remaining arteries of the abdomen may now be examined, next the veins, and lastly, he should proceed to the pelvic viscera. I have been thus minute from having witnessed students much perplexed in what manner to proceed in their examination of the abdominal viscera.

* Syn. Omentum hepatico-gastricum : Membrana macilentior mesogastrium.

† Syn. Omentum colico-gastricum : Epiploon.

sad, and upwards or atlantad to the transverse arch of the colon, marked P in Plate XIV. of Part X., where the two laminæ again separate to encircle this portion of the colon, and meet to constitute the mesocolon, the superior or atlantal layer of which advances upwards on the pancreas D, in Plate IV. of Part II., to the root of the liver i, and diaphragm B, thus forming a complete pouch,* the only aperture to which, termed the foramen of Winslow,† is dextrad and beneath or dorsad to the cystic and hepatic ducts and vessels. This aperture will be readily understood on comparing Plate I. of Part II. with Plate XVI. of Part X. The finger can be easily inserted dextrad and dorsad of the ducts *e*, *f*, M, of the vein N, and the artery q, in Plate XVI. of Part X., when it will be perceived that it raises the omentum minus, as delineated in Plate I. of Part II. The finger passes atlantad of the duodenum c, between the latter and the liver i. The inferior or sacral layer of the mesocolon descends to form the mesentery, and also the mesocolon of the ascending and descending portions of the colon. This peritoneal or omental pouch is also shut up on the left side by the peritoneum investing the spleen F, as will be comprehended by comparing Plates I. and IV. of Part II., with XIV. XV. and XVI. of Part X. From this description it will be at once understood, that that portion of the omentum majus, marked h in Plate I. of Part II., which floats on the small intestines, is quadruple, being formed of the two laminæ from the stomach, and the two layers from the transverse arch of the colon. No viscus in the abdomen is completely surrounded with peritoneum like an orange with its rind, but one and all are merely so enveloped as to be well supported, and in such a manner

* Syn. Marsupium omenti.

† Syn. Porta omenti.

as to enable this membrane to glide onwards to the contiguous viscus. In Plate I. of Part II. the nerves and blood-vessels of this organ are represented, and their description given in the same Part.* If the omentum be very healthy and fat, in a young subject, we may succeed in inflating the omental pouch, by inserting a large blow-pipe, wrapped with cotton, in the foramen of Winslow; but in general it is either so thin and delicate, or so diseased, as to be incapable of this. When matted, there is a difficulty in separating the portion formed by the laminæ of the stomach, from that formed by those of the colon, the latter being closely connected to the greater convex arch of the stomach. If healthy, we can easily make an incision between the stomach and colon, and comprehend the general pouch. In some subjects the omentum majus extends to the ascending portion of the colon, near the caput cœcum, and is then named the omentum dextrum, or omentum cœci; some authors describe an omentum sinistrum; but we might with equal propriety make an omentum lienis, see Plate XIV. of Part X.

I shall now proceed to the description of the alimentary canal, which extends from the mouth to the anus. The mouth, fauces, and pharynx, have been already described in Part IX. In pages 14 and 16 of this latter Part, I have mentioned that the pharynx becomes the œsophagus immediately sacrad to the cricoid cartilage of the larynx, between the latter of which and its continuation the trachea, and the spinal column, the œsophagus descends, enters the thoracic cavity, running in the posterior cavity of the mediastinum, dextrad and sternad of the arch of

* The surgeon should make himself thoroughly master of the connexions of the omentum majus, and also of its nervous and vascular distributions, as this organ is the most frequently ruptured of all the abdominal viscera.

the aorta and its thoracic portion, downwards or sacrad to the diaphragm, at the central or right aperture of which it emerges from the thoracic and enters the abdominal cavity, when it almost immediately dilates to form the stomach. This course of the œsophagus is delineated in Plates I. IV. and VIII. of Part II., in Plate IV. of Part IV., in Plates I. II. III. IV. and V. of Part IX., and in Plates XV. XVI. and XVII. of Part X., marked with the letter I.

The stomach, marked b in Plate I. of Part II., and in Plates XIV. XV. XVI. and XVII. *Figs.* 1, of Part X., is situated partly in the left hypochondriac, but chiefly in the epigastric region, and contracts as it extends towards the right hypochondriac region to become the duodenum c, the first portion of the small intestines.* The duodenum, marked also c in Plate IV. of Part II., descends dorsad in the right hypochondriac region, between the transverse portion of the colon P and the concave aspect of the liver i, towards the right kidney in the renal region, then runs across in the umbilical region, beneath or dorsad to the transverse arch of the colon P, the mesocolon Q, the mesentery, the superior mesenteric vessels V, U, and emerges to become the jejunum K.

The jejunum K, bridled down by the mesentery, occupies the umbilical, the right renal, the right iliac, and hypogastric regions, and not unfrequently descends into the pelvis. This intestine imperceptibly becomes the ileum L, there being nothing to indicate their line of demarcation; the extent of intestine from the duodenum to the colon being commonly divided into five parts; the two contiguous to the duodenum constituting the jejunum, and the three contiguous to the colon constituting the ileum.

* Syn. Intestinum tenue: L'intestine grêle.

The ileum L, bridled down like the jejunum by the mesentery, is situated in the umbilical, hypogastric, pelvic, and right iliac regions, and becomes or joins the colon in the last of these divisions.

The colon, marked M, O, P, Z, in these Plates, and also in Plate V. of Part II., and in *Figs.* 2 and 3 of Plate XVIII. of Part X., begins in the right iliac region, ascends in the right renal and hypochondriac regions, then extends across in the umbilical (close to the epigastric) to the left hypochondriac, where it descends in the left renal and iliac to the hypogastric region, and becomes the rectum I, which descends along the sacrum and coccyx in the pelvis, and terminates externally at the anus I**.

Having described the course of the alimentary canal in this general manner, I shall now proceed with its structure. When investigating the pharynx in Part IX., I described only three tunics, a cellular, a muscular, and a mucous; and the same number and kind will be found to constitute the œsophagus. The alimentary tube, however, when it enters the abdominal cavity, acquires an additional coat, the peritoneal; but it may then be said to lose the cellular, for this becomes so attenuated as to be scarcely visible.—I should say, therefore, that the stomach, the small and the large intestines, consisted of a peritoneal, a muscular, and a mucous tunic. Some authors describe a nervous or vascular coat to be situated between the muscular and the villous; but this is nothing more or less than the cellular tissue which unites the muscular and villous tunics. On the same principle, we should follow the arrangement of other authors, and make the cellular tissue forming the bond of union between the peritoneal and the muscular, a distinct tunic. As these tunics vary considerably on the different viscera, I shall

defer entering more minutely at present, until I come to their individual description, and therefore proceed with the œsophagus.

The œsophagus, marked 1 in Plates I., IV., and VIII. of Part II., in Plate IV. of Part IV., in Plates I., II., III., IV., and V. of Part IX., and in Plates XV., XVI., and XVII. of Part X., I have described to be a continuation of the pharynx, beginning opposite the inferior or sacral margin of the cricoid cartilage, where there is a contraction of the tube at this point, as stated in page 14 of Part XI. The exterior cellular investment of the œsophagus is very loose, and abounds in greater quantity in some parts than in others; more so in the neck than in the thoracic cavity, where the œsophagus runs in the posterior cavity of the mediastinum, and still less so where its lateral parietes are in contact with the pleura. Its muscular fibres are chiefly spiral, a few only being either circular or longitudinal; the circular are situated at its commencement near the pharynx; the longitudinal at its junction with the stomach; and the spiral intermediate. Its mucous coat resembles that of the pharynx, of which it is evidently a continuation, but is of a white colour, and there appear fewer glandular bodies interspersed upon it, with the exception of that portion contiguous to the stomach; lacunæ or cryptæ are, however, very distinct. The extension of the cuticle is now lost to dissection, but by maceration it may be observed. After the œsophagus has entered the abdominal cavity, it acquires a coating from the peritoneum, reflected from the diaphragm, which, however, is extremely short, for the œsophagus almost immediately dilates to become the stomach. The extension of the peritoneum on each side has, however, been named ligamentum phrenico-gastricum, dextrum et sinistrum; that on the right side being continuous with the

omentum minus; while that on the left side, with the omentum majus, or the ligamentum lienis suspensorium. In the ordinary state of the body, the œsophagus is collapsed.*

The situation of the stomach,† marked b in Plate I of Part II., and in Plates XIV., XV., XVI., and XVII., *Figs.* 1, of Part X., has been already described; it consists of two apertures, an entrance named the cardiac, or œsophageal orifice,‡ marked A in *Fig.* 1 of Plates XVI. and XVII. of Part X., and an exit named the pyloric or duodenal orifice,§ marked T in the same figures; of a lesser concave arch D,‖ and of a greater convex arch *b*;¶ of an anterior or sternal surface b, in *Fig.* 1 of Plate XVI., and of an opposite, or posterior, or dorsal surface, both of which, however, vary according as the stomach is collapsed or distended; when it is fully distended, the sternal becomes the atlantal, and the dorsal, the sacral; the stomach also consists of a larger extremity or *cul-de-sac* X,** and of a smaller, marked *x*.†† Its

* The œsophagus is subject to polypi, to fungous and lobulated excrescences, to scirrhus and cancer, some of which are accompanied with stricture or constriction of the canal, and even total obstruction. It is also sometimes affected with spasmodic or permanent constrictions or stricture, producing dysphagia and dilatation, and occasionally with a protrusion of the mucous membrane through a rent of the muscular; and even both of these tunics have been protruded through a gap in the cellular envelope, so as to resemble hernia. When inflammation attacks the œsophagus, it occasionally terminates in ulceration, which sometimes extends to the lungs, to the aorta, to the trachea, and to the skin, forming, in the last case, a fistula. These diseases occur at the extremities of the canal, and more frequently at the pharyngeal than at the ventricular.

† Syn. Ventriculus.

‡ Syn. Cardia: Os ventriculi: Upper orifice: Ostium ventriculi sinistrum.

§ Syn. Pylorus: Right or inferior orifice: Ostium ventriculi dextrum seu janitor: L'orifice intestinal.

‖ Syn. La courbure supérieure: Petite courbure: Bord diaphragmatique.

¶ Syn. La grande courbure: Bord colique.

** Syn. Left extremity: Base: Fundus seu saccus cœcus: Le bas-fond, tubercle, ou grand cul-de-sac de l'estomac: Extremité splenique.

†† Syn. Right extremity: Antrum pylori: Petit cul-de-sac.

size naturally varies according to its distension; in the natural healthy state, when not filled with food, the stomach is collapsed. Its peritoneal tunic has been already described as proceeding from the omentum minus to the lesser concave arch, and extending along its two surfaces, its sternal and dorsal, where it again meets at its greater convex arch to form the omentum majus. It also receives a part of its peritoneal investment from the diaphragm along the œsophagus, and may be likewise said to receive a portion from the duodenum c. This peritoneal membrane is represented reflected off from the muscular tunic, in *Fig.* 1 of Plate XVI., and is marked a; and, in *Fig.* 1 of Plate XVII., where the stomach is laid open, this tunic, a, is displayed throughout.

Some authors describe the peritoneum as forming various ligaments in this region; but these are so delicate and indistinct, as not to be worthy of investigation. Thus, for example, there are vinculum œsophagi; vinculum inter œsophagum et lienem; ligamentum dextrum ventriculi; ligamentum phrenico-gastricum; ligamentum gastro-splenicum.

Its muscular tunic consists of a longitudinal and transverse, or circular arrangement of fibres, the greater number being circular. This tunic is displayed in *Figs.* 1 of Plates XVI. and XVII., and is marked B. In *Fig.* 1 of Plate XVI., the longitudinal fibres of the œsophagus I, appear to form many of both the longitudinal and circular fibres, particularly the former; and both of these fibres seem to form those of the duodenum c. At the pyloric orifice the circular fibres form a constriction, so as to enable this to act as a valve.*

The longitudinal fibres are most numerous on the les-

* Syn. Sphincter pylori.

ser concave arch D. The circular fibres appear to begin at the larger extremity X, and to extend to the pyloric orifice, where they become strongest, interlacing with each other throughout this extent, as if they were only semicircular: some of them, however, have an oblique or transverse direction. Some authors describe a third layer of muscular fibres, to be situated beneath or centrad to these two last, and to be a continuation of the fibres of the œsophagus, running longitudinally, and interlacing with the oblique fibres.

In *Fig.* 1 of Plate XVII., the stomach is laid open from the cardiac, A, to the pyloric, T, orifice, in order to display the mucous coat *m*, which is loose, villous, and glandular, and has a reticular appearance. The mucous tunic is of a reddish rosy colour, which, however, diminishes towards the pylorus. When the stomach is empty, the mucous coat has the appearance of rugæ or plicæ, which vary in size, and run in an irregular waving transverse direction; but at the œsophageal aperture they run more longitudinally, blending with the folds of the œsophagus, of which they appear to be the continuation, and forming a stellated or radiated appearance. The epidermis investing the œsophagus cannot be traced into the stomach, for we fail to trace it further than around the cardiac orifice. At the cardiac orifice A, the lesser arch D, and the pyloric orifice T, the glands are most numerous, but most so at the pyloric orifice;* and at the pyloric orifice T, the mucous tunic is very pendulous, projecting inwards or centrad, in order to contribute to the formation of the valvular aperture T,† which, contrasted with the cardiac A, is remarkably small.

* The glandular structure of these parts of the stomach, particularly at the pyloric, are those which become affected in scirrhus and cancer of this viscus. The pyloric aperture is also the most subject to constriction or stricture.

† Syn. Valvula pylori.

The stomach is larger, wider, and shorter in man than in woman, and its muscular coat is stronger in the former than in the latter. The nervous and vascular distributions to the stomach have been described in Part II.*

The duodenum,† marked c in Plates I. and IV. of Part II., and in *Figs.* 2 of Plates XVI. and XVII. of Part X., the course of which has been already described in page 15, is the shortest and largest in diameter of the small intestines; that portion of its surface which adheres by very loose cellular substance to the vena cava ascendens, the right psoas magnus muscle, the abdominal aorta, and the spinal column, is not covered with peritoneum. The extension of the peritoneum from the duodenum to the right kidney, is named by some authors, ligamentum vel plica duodeno renalis; and these authors also describe a ligamentum duodeno-hepaticum, vel hepato-duodenale.

The muscular tunic of this intestine consists chiefly of circular fibres, which are very strong and distinct.

The mucous tunic, of a white colour, consists of a number of loose plicæ or folds, some of which are of a circular, while others are of a semilunar shape, and are arranged transversely or circularly; some being smaller or narrower than others. They are named valvulæ conniven-

* The nervous, the vascular, the glandular, and mucous structures of the stomach should be carefully investigated, in order to comprehend its diseases. These are dyspepsia, spasm, gastritis, umbilical hernia, scirrhus, cancer, fungous excrescences, fatty tumours, tubercles, polypi, constrictions, so as to divide it into two pouches, ulcers, erosions, spontaneous perforations, softening and destruction of the mucous membrane, small pouches giving lodgment to foreign substances, and hematemasis, and it is involved in cholera and fever, particularly typhus and yellow fever. In the living body, the stomach presents no contraction in its middle.

† Syn. Intestinum digitale: Intestinum rectum brevissimum: Ventriculus succenturiatus.

tes,* where the duodenum c is laid open for a considerable extent, downwards from the pyloric orifice T of the stomach b, and are displayed in *Fig.* 2 of Plate XVII. The smaller valvulæ conniventes are named by some villi, or villosities; but these villi are distinct conical prolongations of the villous tunic, situated between the valvulæ conniventes, and from which this membrane has got its name. These villi are even situated on the valvulæ conniventes, and are so numerous as to be estimated at 4000 on each square inch of the villous tunic. When examined with the microscope, they present a granulated appearance, with a number of open mouths, and are formed of lacteals and blood-vessels, connected with a cellular tissue. They have been named the ampullulæ of Leiberkuhn. Over all the surface of the duodenum, a multiplicity of mucous glands or lacunæ are found.† Between these valvulæ conniventes, a number of small glands are situated, which are named after Brunner.‡ They present a round lenticular appearance, and open with distinct mouths, and are delineated in *Fig.* 2 of Plate XVII.

In *Figs.* 2 of Plates XVI. and XVII., we perceive the ductus communis choledochus M, together with the pancreatic duct P, piercing the walls of the duodenum. In Plate XVII., where the intestine is laid open, we observe the open mouth M*, of these conjoint ducts M and P, with a papillary elongation of the mucous coat around, for in the majority of instances the pancreatic duct joins the ductus communis choledochus before its termination in the duodenum; the latter of which runs first between the peritoneal and muscular, and then between the latter and mucous tunics of the intestine, in order to act as a valve.

* Syn. Valvulæ Kerckringii. † Syn. Cryptæ minimæ.

‡ Syn. Glandulæ solitariæ.

In Plate XVI. the duct M enters the duodenum on its dorsal aspect, near the termination of the first turn, between three and four inches from the pyloric orifice T of the stomach.

The situation and course of the jejunum K have been described in page 15. It, together with the ileum, is held in situation by the mesentery, marked Q in *Fig.* 2 of Plate XVI., and in *Fig.* 1 of Plate XIX. of Part X. This process or duplicature of the peritoneum Q, extends along the abdominal portion of the aorta and the bodies of the lumbar vertebræ, to which it adheres by cellular substance, its two laminæ enclosing the superior mesenteric artery R and accompanying vein U with their numerous branches, together with the lacteal vessels and their lymphatic glands, the superior mesenteric plexus of nerves, a quantity of cellular and adipose substances, and expanding more and more into loose folds as they advance along these vessels to surround the long convoluted extent of the jejunum and ileum. This production of the peritoneum is one of the most beautiful and wonderful productions of Nature. The small portion of root,* with the prodigious extent of ramification, is admirably arranged. The easiest manner for the student to comprehend this tortuous expanse of the peritoneum, is to return to that portion of this membrane already described in page 6, and to examine attentively and minutely the formation of the mesocolon, for the mesentery is formed identically in the same manner. Let him then trace the peritoneum a little atlantad to the brim of the pelvis, keeping the jejunum and the greater portion of the ileum out of his way, and merely allowing enough of this latter intestine to come within his examination, in

* Radix Mesenterii.

order to enable him to comprehend how the peritoneum encircles and braces it down. Where the ileum joins the colon, it is very closely braced down by the peritoneum, there being very little mesentery. After this, he may tracé the peritoneum across the abdomen, so as to traverse the middle of the mesentery; and he will then clearly and perfectly understand that the latter is formed by the peritoneum from both sides of the cavity, uniting on the aorta and spinal column, descending obliquely from left to right, from the second lumbar vertebra to the right sacro-iliac-synchondrosis, and extending along the superior mesenteric artery and vein onwards to the jejunum K, and ileum L, both of which it also invests, so as to remain a continuous surface, being continuous, atlantad, dextrad, and sinistrad, with the mesocolon, and sacrad with the mesorectum and peritoneum investing the pelvis; for, as formerly remarked, the viscera are equivocally said to be without the peritoneum.*

The jejunum K is thus almost entirely surrounded with a peritoneal coat, as illustrated in *Fig.* 1 of Plate XIX., where the one lamina, a, is dissected from the other and the vessels forming the mesentery Q, and left pendulous on the intestine. When the jejunum is fully distended, we observe a distinct arrangement of muscular fibres extending along its convex arch; and precisely in the centre of these a whitish line is described to be visible, and named its ligamentary band: this, however, is so delicate and indistinct in general, as not to be worthy of such an appellation.—It is merely the mucous coat shining through. The circular arrangement of fibres is very distinct, as

* In ascites or dropsy of the abdomen, the serous fluid is contained in the pouch of the peritoneum, between its anterior or sternal portion, investing the abdominal parietes, and that which invests the small and large intestines; and hence these viscera are dorsad to the fluid.

exemplified in *Fig.* 1 of Plate XIX.; and the muscularity of the jejunum, although less than that of the duodenum, forms a striking contrast with the ileum, rendering the former much fleshier and redder in colour than the latter. The mucous coat of the jejunum so precisely resembles that of the duodenum next the jejunum, that I considered it superfluous to give a delineation of it. It is of a whitish colour, and there are fully more valvulæ conniventes in the beginning of the jejunum, but rather fewer solitary glands; the glandular bodies being in oblong clusters, and named plexus glandulosi Peyeri. The villi are also more loose and pendulous. The mucous glands or lacunæ are the same.

The ileum L constituting the remaining three-fifths of the small intestine from the beginning of the jejunum, has been so far described in pages 15, 17, and 23. It differs from the jejunum in being much thinner in its muscular and mucous coats, as exemplified in *Fig.* 1 of Plate XVIII. Its peritoneal tunic has been already described in page 23, together with that of the jejunum.

Both the longitudinal and circular plane of muscular fibres are very indistinct. The colour of the mucous tunic becomes paler, and the valvulæ conniventes become more and more indistinct in the ileum as we advance towards the colon; and, as delineated in *Fig.* 1 of Plate XVIII., there are none in that portion of the ileum: here they are considered by some to run longitudinally. The villi of the ileum are longer, thinner, and more conical than those of the jejunum or duodenum, and are also more remote or apart from each other. The mucous glands or lacunæ are the same. The larger series of glands resemble those of the jejunum, being arranged in clusters, and also named after Peyer; and near the colon they are most numerous, and frequently of considerable

extent, as represented in *Fig.* 1 of Plate XVIII., where, on the mucous tunic *m*, they form irregularly shaped patches. These are found almost exclusively on the sides of the ileum, and not on the convex or concave arches. The nervous and vascular distributions to the small intestines have been described in Part II.*

The colon,† marked M, O, P, *z*, in Plates IV. and V. of Part II., and in Plates XIV. XV. and XVIII. of Part X., has been described, as far as regards its situation, in page 16. It is divided into its caput cœcum M, its ascending portion O,‡ its transverse portion P,§ and its descending portion or sigmoid flexure *z*,‖ with its appendix vermiformis 29. The caput cœcum is the commencement, or that portion which is sacrad or rather distad to the ileum L, and will be best understood by examining *Fig.* 3 of Plate XVIII., where all that is to the right of L and *v* in reference to the observer, is the caput cœcum. The ascending portion O beginning above or atlantad to the caput cœcum, and the junction of the ileum, ends where the intestine advances to the liver i. The colon now begins to extend across, becoming then the transverse portion P, which terminates near the spleen

* The nervous, vascular, glandular, and mucous structures of the small intestines, should be carefully examined in order to comprehend their diseases, as spasm, volvulus, diarrhœa, cholera, constipatio, enteritis, ulceration, mortification, scirrhus and cancer, tabes mesenterica, tubercles, fungous excrescences, fatty tumours, perforations, adhesion to each other, ossification, and hernia. A peculiar malformation occasionally exists in the course of the ileum, a conical projection or prolongation like the finger of a glove originating from its convex arch, named diverticulum; I have seen these four inches long, and they are by no means uncommon. Syn. Diverticule ilial. The tænia, the lumbricus, and the trichuris, species of worms, are found in these intestines.

† Syn. Intestinum crassum.

‡ Syn. Intestinum colon dextrum seu ascendens.

§ Syn. Colon transversum.

‖ Syn. Intestinum colon descendens: Flexura sigmoidea seu iliaca, seu S romanum.

F, where the colon begins to descend and form the sigmoid flexure *z*, which ends in the rectum I. Some authors make a still more minute division of the colon, as, for example, caput; cœcum; ascending part of the arch; transverse part of the arch; descending part; and sigmoid flexure. The colon is held in this extensive course by the omentum majus and mesocolon, the latter of which is marked Q in Plate IV. of Part II., and part of which has been described in page 6, *viz.* that portion which binds down the sigmoid flexure *z*. In some subjects the peritoneum here does not encircle the colon so as to form a mesentery, but only invests that portion of the intestine which is free, a considerable part in such a case adhering by loose cellular substance to the iliacus internus and psoas magnus muscles.* At the caput cœcum, and the commencement of its ascending portion, this deficiency of peritoneal covering and extensive loose adhesion to the muscles is still more frequently the case. Near the right kidney the mesocolon is named the right ligament of the colon, and near the left kidney the left ligament of the colon. The mesocolon is loose and free where it supports the transverse portion, and it is here that it contributes to form the large omental pouch.

That portion of the mesocolon which binds down or supports the ascending portion of the colon is named by some, *le mésocolon lombaire droit;* the transverse portion, mesocolon transversum, and the descending, *le mésocolon descendant.* The mesocolon, as already mentioned, is, like the mesentery, a process of the peri-

* I have been thus particular in describing this portion of the peritoneum, in consequence of this part of the colon, and its caput cœcum, being occasionally forced out in hernia without having a peritoneal herniary sac. When the peritoneum is forced out so as to form a herniary sac, it becomes, on some occasions, greatly elongated, sometimes rendered thicker by an acquisition of cellular substance, and sometimes thinner from over distension.

toneum, and, like it, consists of two layers. In Plate IV. of Part II. we observe it, marked Q, joining the mesentery on its sinistral aspect, and confining the duodenum C, the course of which is indicated by dotted lines, and from thence extending dextral along the ilio-colica *t*, and colica dextra *u* arteries, onwards to the ascending portion of the colon O. This part of the mesocolon adheres firmly to the vena cava ascendens, the psoas magnus and iliacus internus muscles, and admits of no latitude of motion. We perceive also the mesocolon ascending along the colica media artery V, uniting with its opposite lamina, which descends along the pancreas D to support the transverse portion P of the colon. This part of the mesocolon is remarkably loose and free. On the transverse and beginning of the descending portions of the colon, or, in other words, on those portions of the colon which are loose and free, small peritoneal prolongations filled with adipose substance project, which are termed appendices epiploicæ.* These, however, are only observable in fat subjects, for in emaciated ones little or no trace of them is to be found. In *Fig.* 2 of Plate XVIII. there is a process of the peritoneum, marked *l*, extending between the ileum L and the caput cœcum M, connecting these together, and also giving support to the appendix vermiformis 29.

The colon has, besides its three tunics, like the other intestines, three longitudinal muscular bands, marked T in *Figs* 2 and 3 of Plate XVIII., which extend along its walls at equal distances, one of them being hid by the laminæ of the mesocolon. These muscular bands are the longitudinal muscular fibres of this intestine congregated in this peculiar manner; still, however, we can perceive

* Syn. Omentula intestini crassi.

some insulated longitudinal muscular fibres here and there between these three bands. They commence or unite at the appendix vermiformis 29, and terminate in forming the longitudinal fibres of the rectum. These bands purse the colon into these peculiar pouches or cells * so characteristic of this intestine; for when these bands are dissected off, the colon expands to double its natural size, and becomes regularly and uniformly cylindrical. The circular muscular fibres of this intestine are very sparse and thin, being more so than those of the small intestines.†

The mucous tunic, of a very pale white colour, presents a number of depressions and elevations, which make it appear at first sight that this membrane is loose and free; the depressions have a reticular or honeycomb appearance, somewhat similar to that of the stomach; and the little elevations which separate these, occupy the greater space, and resemble the villi of the small intestines. We observe also a multiplicity of mucous glands studding this mucous tunic, as delineated in *Fig.* 3 of Plate XVIII.‡

In *Fig.* 3 of Plate XVIII, the valve of the colon,§ marked with the letters *v*, is displayed, which is formed by the ileum extending into the colon, the two productions or folds *v*, *v*, consisting of the mucous and muscular coats of both the ileum and colon, those of the latter being reflected inwards; but only the circular muscular fibres of the ileum are concerned, the longitudinal fibres with the peritoneal coat running on the colon. These folds *v*, *v*, are of a semilunar shape, like the valvulæ conniventes, are

* Syn. Cellulæ seu haustra.

† The colon, particularly its sigmoid flexure, is very subject to constrictions or stricture.

‡ The sigmoid flexure, of all the portions of the colon, is the most subject to scirrhus, and cancerous ulceration, accompanied with stricture, and even total obstruction, producing great dilatation in the upper portion of the intestine.

§ Syn. Valvula vidi vidii: Valvula Bauhini: Valvula ileo-colica.

extremely loose and floating, and run sternad and dorsad, or forwards and backwards, meeting with each other so as to form two commissures. The atlantal or superior is narrower than the sacral or inferior, situated nearly horizontal, and forms almost a right angle with the ascending portion of the colon. The inferior or sacral is larger, and describes a more acute angle with this portion of the colon. These folds *v* overlap each other, and, when separate, they form an elliptic aperture of considerable magnitude, fully the size of the ileum.*

The appendix vermiformis, marked 29 in Plate IV. of Part II., and in *Figs.* 2 and 3 of Plate XVIII. of Part X., is a peculiar funnel shaped prolongation of the colon at its caput cœcum, generally about three inches long, and is therefore the shortest and narrowest portion of the alimentary tube. In the connected state, it is generally hid by the caput cœcum and ileum, and has a short narrow mesocolic production which binds it down, and gives it a tortuous appearance. It possesses peritoneal, muscular, and mucous tunics, like the rest of the alimentary canal. Its muscular coat is formed by the termination, or commencement of the three longitudinal muscular bands of the colon. It commences by an open mouth, at the beginning of the caput cœcum, as represented in *Fig.* 3 of Plate XVIII., where there is a number of mucous glands, which are still more numerous on the mucous tunic of this appendix. Morgagni describes a sort of transverse fold or species of valve being found at the mouth of this appendix, but this I have never observed.

The nervous and vascular distributions to the colon have been described in Part II.†

* The attachments and configuration of these folds, together with the direction of this aperture, should be considered with regard to overcoming the obstacle offered by them, when employing enemata in volvulus.

† The extent of the cœcum, which is about an inch and a half from the ileum,

The course of the rectum, the widest in diameter of the intestines, has been already generally described in page 16, and marked I, in Plates V. and VI. of Part II., in Plate XIV. of Part III., in Plates XIV. and XV. of Part X., in the last of which the I, has an asterisk * after it, and in Plates V. and VI. of Part XI. In the female subject, it is observed to descend behind, or sacrad to the uterus k, and the vagina D, adhering intimately to the latter, but in no degree with the former;* and leaving the vagina where the perineum E, Plate III. of Part XI., intervenes, this space being occupied by the sphincter vaginæ N, sphincter ani r, and levator ani s muscles, as represented in Plate IV. of Part XI. together with the integuments, and cellular and adipose substances. In this course the rectum adheres by cellular substance to the os sacrum B, and os coccygis, being in its extent from the promontory of the sacrum to that part where it is not invested with the peritoneum, a little sinistrad from the mesial line; but from the part uncovered with the peritoneum to its forming the anus, as that marked I* in Plate V. of Part XI., it runs precisely in the mesial line.

As delineated in Plate VI. of Part XI., the peritoneum *a*, is observed to extend along the rectum I, encircling it for some extent a little beyond or coccygead to the os uteri R, when it stops, and from thence re-ascends to be reflected on the sacral aspect of the uterus k. The lateral folds of this inflection or cul-de-sac, which run somewhat longitudinally, are named plicæ semi-lunares. At the

together with the cells of the colon, should be carefully examined in their relation to the lodgement of scybalæ, to constipation, cholera, and dysentery. And the nervous, vascular, and mucous structures of the colon should be examined, in reference to these diseases, and also to diarrhœa, spasm, enteritis, tubercles, and hemorrhage. Calcareous concretions are sometimes formed in the colon.

* In extirpation of the uterus, the non-connexion of the uterus with the rectum should be kept in view.

promontory of the sacrum, and for a little extent downwards in the pelvis, the rectum is so encircled with the peritoneum, that there is a mesentery here formed, named mesorectum; a short distance, however, before the peritoneum is reflected on the os uteri, this membrane only clothes the anterior or pubic aspect of the rectum; coccygead to this, the rectum, marked I*, is totally divested of a peritoneal tunic.

The muscular fibres of the rectum are remarkably numerous and strong, are arranged longitudinally, being the continuation of those fibres forming the longitudinal muscular bands of the colon, and are represented in Plates V. and VI. of Part XI.; there are also circular muscular fibres,* situated beneath or centrad to these longitudinal ones.

In the male, the course of the peritoneum is different; it does not encircle the rectum so far coccygead, but invests only its pubic aspect, as represented by the white line extending between the rectum I, and the bladder m, in Plate XIV. of Part III.; and from the rectum I, it is reflected on the urinary bladder m, and ascends to its fundus; this fold or doubling of the peritoneum being named the cul-de-sac.†

The rectum proceeds along the coccyx, covered by the levator ani muscle r, and projecting beyond the coccyx, is covered and supported by the sphincter ani muscle s, and terminates in forming the anus I**, the mucous membrane here uniting with, or running into the cutane-

* The rectum, from its muscularity, is subject to both spasmodic and permanent stricture.

† This inflection of the peritoneum should be duly considered by the operator in puncturing the urinary bladder, and in the recto-vesical operation for calculus in the bladder.

ous.* The mucous membrane, of a whitish colour near the colon, becomes slightly rosy near the anus, is loose, and studded with simple mucous glands,† which, however, are not very numerous.

I shall now proceed to the description of the fixed viscera, beginning with the liver.

The liver,‡ marked with the letters i in Plates I. and IV. of Part II., and in Plates XIV. XV. XVI. and XVII. of Part X., is the largest conglomerate gland in the body, is situated in the right hypochondriac the epigastric and in the left hypochondriac regions; and is observed to extend more into the left hypochondriac region in woman than in man. In the fetus, the liver bears a considerably larger proportion to the other viscera, than in the adult. The liver descends much lower or sacrad on the right than on the left side; its right extremity rests on the right kidney, its left on the stomach near its cardiac orifice, while its free margin floats on the stomach, duodenum, and colon, extending outwards or periphero-sacrad nearly to the sacral margins of the cartilages of the last true and all the false ribs of the right side. It is held in this situation by duplicatures of the peritoneum, which are named the ligaments of the liver. In early age onwards to the meridian of life, the colour of the liver is a reddish-brown; but after this

* Children are not unfrequently born with an imperforated anus, in which case the rectum terminates in the male either an inch or two from the anus, or in the urinary bladder, or in the urethra; and in the female, in the vagina, or within an inch or two of the anus. The accoucheur should, therefore, be on his guard for such malformations, and both he and the operator ought to make themselves perfectly masters of the pelvic viscera and their blood-vessels.

† These glands are very subject to disease, viz. to inflammation and suppuration, to tubercles, to stricture, to scirrhus, and cancer.

‡ Syn. Hepar: Jecur.

period, it progressively becomes darker in colour. The peritoneum a, a, after investing the diaphragm B, B, as delineated in *Fig.* 2 of Plate XVI. of Part X., unites in the mesial line of the body, beneath or centrad to the linea alba, from the umbilicus onwards near to the middle of the diaphragm, to form the suspensory ligament* A, of the liver, which is further strengthened at its free margin by the round ligament† c. These descend centrad or dorsad in the liver between its two great lobes I, i; the suspensory ligament A, again expanding on the convex aspect of the liver to become the peritoneal envelope of this organ. The round ligament c, which was the umbilical vein in the fetus, is also surrounded with the peritoneum, begins at the umbilicus, and descends between the two great lobes I, i, to become incorporated likewise with the peritoneal investment of the liver. When we reflect downwards or sacrad the sternal margins of the two lobes I, i, of the liver, so as to remove them a little from the diaphragm B, we find the peritoneum a, proceeding from the one organ to the other; and this angular fold, or angle of inflection of the peritoneum, is termed the coronary ligament of the liver. A considerable portion, therefore, of the liver adheres to the diaphragm through the medium of cellular substance; hence this viscus, like the intestines, is not entirely surrounded with the peritoneum. At the left extremity of the liver, where it projects into the left hypochondriac region, the peritoneum forms a loose doubling like the suspensory ligament, which extends between the left lobe of the liver i and the diaphragm B, and is denominated the left lateral ligament of the liver,‡

* Syn. Ligamentum latum: Ligamentum suspensorium: Ligamentum falciforme: Suspensorium hepatis: Middle ligament of liver.

† Syn. Ligamentum teres: Umbilical ligament.

‡ Syn. Le ligament triangulaire gauche.

and is marked E. A similar ligamentous production extends between the right lobe I and the diaphragm B, which is named the right lateral ligament.* Other ligaments are described by authors, as the ligamentum hepato-colicum, which is a production of the peritoneum, extending from the gall bladder along its duct, and the duodenum to the colon: this, however, is the result of disease. A ligamentum hepato vel hepatico-renale, or plica hepatico-renalis, which connects the root of the right lobe of the liver to the right kidney, is also described; but this portion of the peritoneum is flat and adherent, and not entitled to the appellation of ligament. The peritoneum invests all the surface of the liver, with the exception of those points already described, and where the gall bladder e rests, and also where the liver rests on the vertebral column, or rather on the crura of the diaphragm, and likewise where the vena cava runs, as will be understood by examining Plate XV.

The liver consists of a convex surface pointing towards the diaphragm B, and of a concave surface I, i, towards the other abdominal viscera; of a free thin margin, which points sternad and peripherad, and of a fixed thick margin pointing dorsad; of a right and a left extremity; of two distinct lobes, a right one marked I, and a left i, with an accessory one to the right, termed the lobulus Spigelii, and marked k. Authors, however, describe a lobulus caudatus,† which is merely the connecting isthmus between the right lobe I and the lobulus Spigelii k, and is marked Y in *Fig.* 2 of Plate XVII.; and a lobulus quadratus vel anonymus,‡ which is the gentle elevation

* Syn. Le ligament triangulaire droit.

† Syn. Processus caudatus.

‡ Syn. Lobulus accessorius: Lobulus anterior.

between the gall bladder e and the pons hepatis H, and is marked G in *Fig.* 2 of Plate XVI.

The right lobe I, situated dextrad of the round ligament c, lies in the right hypochondriac region, is much the largest, being nearly four times larger than the left, forming all the lesser lobes, and occasionally almost the whole bulk of the liver. Between the right I and left i lobes, or, if we make a quadratus, between the quadratus G and the left lobe i, there is a small square portion of the liver, marked H, named the pons hepatis,* extending over the sulcus between the right and left lobes, which sulcus, marked V in *Fig.* 2 of Plate XVI., lodges the round ligament c that was the umbilical vein in the fetus, and hence termed fossa umbilicalis.† The continuation of this umbilical fossa downwards between the lobulus Spigelii and the left lobe, is named fossa ductus venosi,‡ from lodging this vein, one of the continuations of the umbilical vein in the fetus; while the whole extent of this sulcus, or both of these just enumerated, is named by some, fossa longitudinalis sinistra. The pons hepatis is frequently deficient.

The lobulus Spigelii k,§ is merely a projection of the right lobe, and with the quadratus G forms what is named the porta, which gives entrance to the vena portæ N, together with the hepatic artery q, and exit to the hepatic duct *f.* The hepatic plexus of nerves and lymphatic vessels also pass and repass here. The space bounded by the lobulus Spigelii k and quadratus G which are opposite each other, and by the diagonal points, the cau-

* Syn. Isthmus hepatis.

† Syn. The great fissure: Horizontal fissure: Fossa anterior, longa, longitudinalis: The great scissure: Fovea pro vena umbilicali, seu ligamento terete.

‡ Syn. Sulcus ductus venosi: Left fissure: Posterior fissure.

§ Syn. Lobulus posterior: Lobulus papillatus.

datus Y and contiguous projection of the left lobe,* and all of which surround these vessels and ducts, is denominated the sinus of the vena portæ.†

On the dorsal aspect of the right lobe, between it and the lobulus Spigelii, as represented in *Fig.* 2 of Plate XVII., a conspicuous depression or sulcus is observable, which is occupied by the vena cava ascendens, that frequently is imbedded in the substance of the liver at this part, and is termed fissura venæ cavæ.‡ In Plate XV. of Part X., which is a posterior view of the thoracic and abdominal viscera, the vena cava *i* is seen running imbedded in the substance of the liver marked i; there is, therefore, here no peritoneal investment. The vena cava is joined, during its passage along the liver, by the venæ hepaticæ, which open generally with eight mouths, as described in page 22 of Part II. A little sinistrad of this last sulcus, on the dorsal aspect between the right and left lobes, a very gentle depression is observable, made by the spinal column, but from the diaphragm intervening, this depression is always very slight; there is here also no peritoneal covering.

The only other depression is that made by the gall bladder e on the concave aspect of the right lobe, dextrad of the lobulus quadratus G, as delineated in *Fig.* 2 of Plate XVI. In Plate XVII. the gall bladder is removed from its depression, which is marked W,§ and is not invested

* This projection of the left lobe is named by some authors, lobulus lobi sinistri.

† Syn. Sinus portarum: Sulcus transversus: Principal fissure: Sulcus intermedius seu transversus.

‡ Syn. Fossa venæ cavæ.

§ Syn. Fovea fellis: Vallicula vesiculæ felleæ: Fossa pro vesicula fellea. By some the depression of the gall bladder, and that for the vena cava, is considered as one fossa, and named fossa longitudinalis dextra.

with peritoneum, this membrane gliding from the liver over the exposed surface of the gall bladder, in order to retain the latter in its situation. In the fetus, the gall bladder projects more out from the liver than in the adult. The right kidney generally makes a slight indentation on the right lobe.

The vena portæ, marked N, n, *n*, in Plate IV. of Part II., and in *Figs.* 2 of Plates XVI. and XVII., has been already described in Part II. page 21, and so also have the hepatic veins in page 22, and the hepatic artery q in page 18. In page 22 of Part II. the vena portæ N is described onwards to its division in the substance of the liver. In a successful injection, its minute branches are found to consist of two series, a smaller and a larger; the larger is subdivided ultimately into vessels about a line in diameter, which communicate directly with the commencements of the hepatic veins, already described in page 22 of Part II. The smaller and much more delicate branches can be traced to the pori biliarii, or the commencements of the hepatic ducts, which do not inosculate with them. These terminations of the vena portæ are named penicilli. Some of these delicate branches proceed to the cortical substance of the liver.

On making a section of the liver, or in tracing the vessels and ducts into its substance, as delineated in *Fig.* 2 of Plate XVI., besides the ramifications of the vena portæ, the hepatic artery, the hepatic veins, the hepatic nerves, lymphatics, and the hepatic duct, together with a quantity of cellular substance, we perceive that it consists of two textures mingled together, the one alternating with the other. At first sight they appear to consist of undulating bands about half a line in thickness, but on more minute investigation, the yellowish coloured texture forms a coherent mass interspersed throughout, and producing a multitude of ele-

vations and depressions, at the same time that there occurs a number of interruptions, thus forming a very complicated structure. This is compared to the medullary structure of the brain or kidney, and if more minutely examined, consists of small points or grains. In these intervals or gaps, which are scarcely a line in diameter, and of a polygonal starry shape, a much softer and less transparent texture is found, which is compared to the cortical structure of the brain or kidney. The smallest collections of these two textures are named lobuli, or acini.

The hepatic duct* *f*, in Plate IV. of Part II., and in *Figs.* 2 of Plates XVI. and XVII., is observed to be formed in the last of these plates by a multiplicity of smaller ducts, which accompany the subordinate branches of the vena portæ, and concentrate in the first instance into two large branches, and secondly into one trunk. The one branch proceeds from the right, and the other from the left lobe of the liver. The minute commencements of these smaller biliary or hepatic ducts are named pori biliarii, and seem to begin where the medullary and cortical substances unite; for they are never found to originate from the surface, but always from the interior of the liver. The hepatic duct *f* emerges from the liver at the sinus portarum, and after a short course is joined by the cystic duct *e*, the union of which constitutes the ductus communis choledochus M,† that proceeds sacrad and dorsad of the duodenum c, the coats of which it pierces between three and four inches from the pyloric orifice T of the stomach, as described at page 23. The ductus communis choledochus M, together with a portion

* Syn. Ductus excretorius hepatis.

† Syn. Common duct: Ductus choledochus: Ductus hepatico-cysticus.

of the cystic *e* and hepatic *f* ducts, the vena portæ N, the hepatic artery q, the hepatic plexus of nerves, and the lymphatics of the liver, are all enveloped in a production of the peritoneum, which unites them together. That which more immediately surrounds the vena portæ, the hepatic artery, and hepatic duct, and accompanies them into the substance of the liver, is named the capsule of Glisson, which has been already described in page 22 of Part II.

The cystic duct *e* is observed in *Figs.* 2 of Plates XVI. and XVII. to be the excretory tube of the gall bladder e, the latter of which is situated in a depression w on the concave surface of the right lobe I of the liver. The gall bladder,* of a pyriform shape, consisting of a fundus or its larger round bulbous extremity, a body or middle, a cervix or its narrow contracted extremity, and a mouth contiguous to this latter, is thus imbedded in the liver, and retained by the peritoneum gliding from the right lobe I over the gall bladder e to the lobulus quadratus G, as illustrated in *Fig.* 2 of Plate XVI. It has thus a partial peritoneal coat. Beneath or centrad to this there is a delicate muscular tunic, the peripheral or outer surface of which is of a whitish colour, and throughout which a number of blood-vessels are found distributed. Underneath this muscular tunic there is a mucous coat, presenting an elegant reticular appearance, the figures of which are irregular pentagons, resembling that of the stomach. Small apertures are perceptible over this mucous surface, which are the mouths of glandular lacunæ or small mucous glands. Transverse folds are described by some authors as being found at the neck of the gall bladder, and in the cystic duct, having their

* Syn. Cystis: Vesicula fellea:. Chole-cystis: Cystis fellis: Vesicula.

free edges pointing to the gall bladder; but these seem to be merely the free folds of the cells accumulated, and have a longitudinal or spiral more than a transverse direction. Neither the cystic nor the hepatic duct appear to possess muscular tunics. Both of them have a peritoneal, a condensed cellular analogous to a muscular, and a mucous coat. In the interior of the liver the hepatic duct has merely the condensed cellular and mucous coats. Both the hepatic and common choledoch ducts have smoother mucous tunics than the cystic, and have numerous mucous lacunæ opening into them.*

The spleen, marked F in Plates I. and IV. of Part II., in Plates XIV. and XV., and in *Fig.* 2 of Plate XVI. of Part X., is an oblong shaped viscus, of a dark purple colour, situated in the left hypochondriac region, between the left extremity of the stomach and the diaphragm, and held in this situation by the peritoneum reflected from the diaphragm, from the pancreas along the vessels of the spleen, from the stomach and colon through the medium of the omentum majus and vasa brevia, and also from the left kidney. In some cases the omentum majus extends from the œsophagus along the great arch of the stomach to the spleen, and this portion has been named by some authors, vincu-

* The relative situation and the structure of the liver, together with its circulation and secretion, should be carefully investigated and considered by the practitioner, as it is subject to many diseases. It is involved more or less in all the affections of the stomach, and in every variety of fever. Its function of secretion is affected by every kind of diet, and every variation of the weather. It is concerned in icterus, and very easily ruptured by a fall or a blow; it is subject to hepatitis, acute and chronic, to hepatocele, abscess, ulceration, scirrhus, cancer, tubercles, hypertrophy, induration, softening, conversion into adipose substance, and to ossification of its investment. Its ducts are subject to spasmodic and permanent stricture, to obstruction, and to calculi. The gall bladder is occasionally deficient, and in some instances a double gall bladder has been found.

lum inter œsophagum et lienem. The extension of the peritoneum from the spleen to the kidney is also termed by some, plica renalis et capsularis. But sometimes we find these productions of the peritoneum remarkably delicate, while at others of some strength, but on no occasions so strong as to entitle them to the appellation of ligaments. The spleen is thus invested with a peritoneal tunic, and beneath or central to it is a fibrous coat, with which it is so intimately united as to be incapable of separation, excepting at the fissure where the blood-vessels enter its substance, and even there only for a very trifling extent. The surface of the spleen which is opposed to the diaphragm is convex, while that which rests on the left extremity of the stomach is concave, an acute margin forming the limits of these two surfaces. This margin is sometimes notched, as in *Fig.* 2 of Plate XVI. On the concave aspect we observe a fissure, by which the blood-vessels enter, surrounded with a quantity of cellular and adipose substances. The splenic artery r, and its accompanying vein *s*, have been already described in page 18 of Part II. onwards to their entering this viscus; and in *Fig.* 3 of Plate XVI. of Part X. these vessels are developed onwards to their distribution into the substance of this organ. The artery divides into a number of ramifications, which terminate in the most delicate twigs, grouped like the hair of a paint-brush, without inosculating. The veins are arranged around these arterial bundles, anastomose frequently with one another, and with those in their contiguity.

Its texture is remarkably soft and delicate, and appears to be entirely formed of blood-vessels; there is, however, a multitude of lamellæ and delicate fibrous prolongations proceeding from its fibrous investment, interwoven in a

variety of ways, leaving irregular intervals for the distribution of the blood-vessels. There are also a multiplicity of white round soft corpuscles, plentifully supplied with the blood-vessels. The nerves distributed on the spleen have been already described in Part II. It has also a number of lymphatics.*

The pancreas, marked D in Plate IV. of Part II., in Plate XV., and in *Fig.* 2 of Plate XVI. of Part X., is an oblong shaped flattish conglomerate gland, situated in the epigastric and left hypochondriac regions, and extending transversely across the spinal column, having the stomach on its sternal, and the second last dorsal vertebra on its dorsal aspect, and the liver on its dextral, and the spleen on its sinistral aspect, and encircled by the convolutions of the duodenum. It has been compared in shape to the tongue of the dog, the root being its right or duodenal extremity, and the apex its left or splenic extremity; having also an anterior or sternal surface compared to the dorsum of the tongue, and a posterior or dorsal surface compared to the inferior surface of the tongue; likewise two sides or margins, an upper or atlantal, and a lower or sacral; and lastly, a body or central portion. Its sternal or anterior surface is invested with the peritoneum, while its posterior or dorsal aspect adheres by cellular substance to the duodenum, the vena portæ, the superior mesenteric artery and vein, the splenic artery and vein, the aorta, the crura of the diaphragm, and the atlantal extremity of the left kidney.

* The delicate structure of the spleen should be considered by the practitioner, as it is easily ruptured in falls or by blows. It is involved in all affections of the stomach and liver; is subject to hypertrophy, splenitis, splenocele, scirrhus, tubercles, induration, and to ossification of its membranes. Appendages of the spleen, named accessory, not unfrequently exist, and are situated on its concave aspect, near its inferior or sacral extremity.

It has, therefore, only a partial peritoneal tunic, but a complete cellular one, the cellular membrane running beneath the peritoneal tunic. By some it is compared to the figure of a hammer, and is described as being situated between the folds or laminæ of the mesocolon, but this is evidently incorrect.

The pancreas is of a yellowish-brown colour, and precisely resembles the parotid and other salivary glands. On first examination, it is of a pretty firm consistence; but its lobes may be divided into grains, or granulæ, or acini of extreme tenuity, which are only held together by a very loose cellular tissue.

On making a longitudinal section of the pancreas, as delineated in *Fig.* 2 of Plate XVI., a long white duct* is displayed running throughout its whole length, beginning at its sinistral extremity, by several smaller ducts uniting at an acute angle, and being joined in its progress by a multiplicity of other small branches at a right angle; it terminates in the duodenum c, either by one or two tubes, or joins the ductus communis choledochus M, immediately at its termination in the duodenum; the latter of which is the more common occurrence, as described in page 23. Some are of opinion that the large pancreatic duct never enters the common choledoch duct, but runs on its left side separately, onwards to the duodenum, passing, like the biliary duct, between its coats. This duct joins occasionally the duodenum, nearly ten inches distant from the pylorus. The pancreatic duct has been found occasionally double throughout. Near its termination in the duodenum, it generally receives one or two conspicuous branches from that portion of the gland attached to the duodenum, which is named by some authors the head of the gland, and by others, the pancreas minus. These smaller ducts,

* Syn. Ductus pancreaticus: Ductus Wirsungianus.

however, occasionally terminate separately in the duodenum. When we trace the small ducts which feed the large one, we find them originating at the small grains.* The nerves and blood-vessels of the pancreas have already been described in Part II., pages 19, 22, and 29.

The kidney, marked Y, in Plate V. of Part II., in Plate XV., and in *Figs.* 2 and 3 of Plate XIX. of Part X., is a large conglomerate gland of the shape of the French bean (phaseolus), situated in the renal or lumbar region, between the last or twelfth rib and the crista of the os ilium, the right kidney being placed a degree lower or more sacral than the left, in consequence of the situation of the liver. It is situated dorsad, or behind the peritoneum, between it and the psoas magnus and quadratus lumborum muscles, adhering to all of them by loose cellular substance. The kidney occasionally extends on the left side so high as the eleventh or even the tenth rib, but on the right seldom higher than the eleventh.

The kidney has a convex lateral and a concave mesial margin, with a concavity or fissure at the latter ;† an upper or atlantal, and a lower or sacral extremity ; an anterior or sternal, and a posterior or dorsal surface. At its atlantal extremity there is a glandular tissue, marked *y*, in Plate XV. of Part X., named capsula renalis ;‡ and at its concave mesial margin the renal artery C, with its accompanying vein, and the ureter w, enter and emerge, and there is a quantity of adipose and loose cellular substances found here. The peritoneum merely glides over the sternal surface of the kidney, there being inter-

* The pancreas is involved in scirrhus and cancer of the stomach, occasionally in diseases of the liver and spleen, and is subject to hypertrophy, induration, scirrhus, and cancer. Calcareous concretions have been found in its duct.

† Syn. Hilus renalis : Scissure du rein : Bosom of the kidney : Fissure of the kidney : Sinus of the kidney.

‡ Syn. Glandula atrabiliaris.

posed a quantity of adipose substance; a profusion of loose cellular tissue surrounds the whole of the kidney, constituting its cellular tunic;* and beneath or centrad to this is a white fibrous membrane, rough on both its surfaces, closely investing also the whole of the gland which is named its tunica propria. By some authors this membrane is not allowed to be sensibly fibrous, but only to be very solid, and approach very closely to fibrous membranes.

The kidney consists of two textures, a cortical,† marked B in *Figs.* 2 and 3 of Plate XIX., and a medullary,‡ marked *p** in the same figures. The cortical substance B, completely encircles the medullary *p**, and even sends prolongations between the various papillæ *p**, which constitute the medullary structure, to the concavity of the gland. The cortical is of a lighter red than the medullary, of a softer consistence, and consists almost entirely of blood-vessels and glandular corpuscles,§ which are the commencements of the tubuli uriniferi.

The arterial vessels are exceedingly delicate,—they encircle and penetrate the glandular corpuscles, which are of various figures, being either round, quadrangular, pentagonal, or hexagonal; and the commencements of the tubuli uriniferi here begin, being connected with the blood-vessels by a soft whitish cellular tissue. These tubuli ‖ are small, of a whitish colour, and very flexuous, forming a diversity of figures, inosculating freely with each other, and running for the most part insulated, but sometimes united in pairs.

* Syn. Membrana seu capsula renum adiposa.

† Syn. Substantia corticalis, seu glandulosa, seu secernalis.

‡ Syn. Substantia medullaris, seu tubulosa, seu fibrosa, seu sulcata, seu striata, seu urinifera; la substance cannelle, ou sillonnée.

§ Syn. Corpora globosa: Acini: Globuli arteriarum termini.

‖ Syn. Canales corticales: Conduits de Ferrein.

The medullary texture, marked with the letters *p**, consists of a number of conical or pyramidal bodies, varying from seven to twenty in number, with their bases pointing peripherad and their apices centrad towards the pelvis P of the kidney; the latter, or apices *p*, being named papillæ uriniferæ.* These medullary cones *p**, nearly approximate each other, space being merely left for the blood-vessels to proceed to the cortical substance. This medullary substance is darker in colour, firmer, and harder than the cortical; it has fewer blood-vessels, consisting chiefly of straight uriniferous tubuli,† the continuation of the flexuous tubes in the cortical substance, which are now more concentrated, and consequently larger, and which run parallel with each other onwards to the papillæ *p*, where they terminate by small apertures, either in a depression in the centre of the papillæ *p*, or around these projections, from which, in a recent kidney, the urine may be with facility pressed out. In the majority of cases, the small depression is observable in the centre of the papillæ, in which the foramina, the mouths of the tubuli uriniferi are perceptible. Sometimes these cones are quite distinct at their bases, but are united at their apices.

The papillæ uriniferæ *p*, are encircled by a large common membranous pouch, marked P, named the pelvis of the kidney, which is laid open in *Fig.* 3, bringing into view the manner in which these papillæ project into the cavity of the pelvis, and how each is surrounded with a loose fold of this membrane, termed its calyx, and the prolongation of which, towards the pelvis, together with the calyx, is styled infundibulum. These views are from the

* Syn. Papillæ renales: Substantia papillaris: Processus mammillaris: La substance mammelonnée.

† Syn. Ductus seu tubuli Belliani, seu renales.

kidney of a subject about ten years old, and in which the infundibuli are not so well developed as in the adult. The pelvis, also, is not just so broad. The papillæ themselves have a very delicate extension of the membrane constituting the calyx spread over them. The pelvis, which is simply the accumulation of the infundibuli, or an enlargement of the ureter W, immediately on its emergence from the concavity of the kidney, contracts to form the ureter W; the course of which I shall defer tracing until I have described the vessels and capsula renalis. The renal plexus of nerves has been described in page 30 of Part II., and the renal artery in page 23 of the same Part, onwards to the concave aspect of the kidney, where it divides into branches which run around and exterior to the pelvis P, and proceed between the medullary cones *p**, outwards to the cortical substance B, where they subdivide and form arches turned towards each other, encircling and disposed in rays of most minute vessels around the glandular corpuscles, which they appear to form. The arterial branches, in their progress between the medullary cones, and even after they have formed the arches, do not inosculate. It is only the minute filaments disposed around the corpuscles which anastomose.*

* One or both kidneys are sometimes deficient; both have been found in the pelvic cavity; one of them is often much larger than the other; both are occasionally considerably larger than nature, being particularly elongated; and they are not unfrequently united into one by a bond of union, extending between their inferior or sacral extremities across the aorta and vena cava, having a semilunar shape, a specimen of which I possess in my museum. They sometimes present a lobulated appearance, like that of the cow. Two pelves and two ureters sometimes exist. The kidneys are subject to hypertrophy and to atrophy, in the latter of which cases they sometimes diminish greatly in volume, but what remains is solid, while at other times they preserve their size, but are converted into a very thin sac.

The capsula renalis,* marked *y* in Plate XV. of Part X., situated on the upper or atlantal extremity of the kidney Y, to which it adheres by cellular substance, is a triangular body, flattened anteriorly or sternad, and posteriorly or dorsad, having its apex pointing upwards or atlantad. The capsula renalis of the left side is less, and rises higher or atlantad than that of the right side. Its anterior or sternal surface is invested with the peritoneum, and presents some furrows where the blood-vessels enter and emerge from its substance. It is surrounded or enveloped with a very thin serous membrane, which intimately adheres to its surface. This organ is of a tolerably firm lobulated texture, like the parotid gland, of a yellowish brown externally, and of a reddish brown internally. The external yellowish brown texture is firmer, and consists of fibres arranged perpendicularly from without inwards; while the internal reddish brown texture is softer, and forms the parietes of a small triangular cavity, which is supposed by some not to exist until after death, and that then it is the result of a spontaneous decomposition of the internal texture; but I may remark, that it is more easily discovered in the fresh than in the putrid state. The renal capsule is an imperfect gland, having no excretory duct.

The blood-vessels of the renal capsule have been described in page 23 of Part II.†

The pelvis of the kidney, marked P in *Figs.* 2 and 3 of Plate XIX. of Part X., I have already stated, diminishes in its calibre as it emerges from the concave fissure

They are subject to nephritis, abscess, scirrhus, cancer, tubercles, hydatids, and to calcareous depositions.

* Syn. Ren succenturiatus: Capsula seu glandula supra-renalis seu atrabiliaris.

† There is sometimes an increase of the renal capsule, so as to make it resemble more than one. It is besides subject to hypertrophy.

of the kidney to form the ureter w. The ureter, marked w in *Figs.* 2 and 3 of Plates XIX. XV. and XIV. of Part X., in Plates I. II. V. and VI. of Part XI., and in Plate XIV. of Part III., and Plate V. of Part II., in the last of which it is inadvertently marked f, descends behind or dorsad to the peritoneum, obliquely across the psoæ muscles M, K, dorsad to the spermatic plexus *g*, and sternad to the common iliac artery P, and then enters the pelvic cavity, running parallel with the internal iliac artery V, towards the body of the urinary bladder m, along which it extends near to its cervix, where it runs between its muscular and mucous tunics, and terminates by an orifice smaller in diameter than itself. In its course in the pelvis of the female it runs by the side of the uterus k,* and in that of the male it passes outwards or laterad to the vas deferens v.† The precise termination of the ureter in the male is displayed in Plate XIV. of Part III., and Plates I. and II. of Part XI., and in the female, in Plates V. and VI., whale-bone probes, marked s, being inserted in the termination of the ureters in Plates II. and VI.

The ureter is formed of three tunics, a cellular which is very loose, a muscular which appears condensed, fibrous, cellular substance, and a mucous that is thin and loose, and continuous with that investing the papillæ of the kidney, and with that of the urinary bladder.‡

* In extirpation of the uterus, the operator must keep in view the course of the ureter.

† In the lateral operation of lithotomy, the operator must remember the termination of the ureter in the bladder; his incision should extend between this and the vesicula seminalis.

‡ The ureter is sometimes deficient, occasionally terminates in the abdominal parietes between the umbilicus and symphysis pubis, frequently double on one side. It is subject to constriction, stricture, dilatation, and to calculus.

VISCERA OF THE PELVIS,

TOGETHER WITH

THE ORGANS OF GENERATION IN THE MALE AND FEMALE.

In the description of the viscera of the pelvis, I shall pursue the same connected arrangement as I have adopted with regard to those of the abdomen, and not in the order which the student should follow.* In the male pelvis there

* The student, when investigating the pelvic viscera and organs of generation of the male, should first examine the inflections of the peritoneum, particularly as they relate to puncturing the bladder above the pubes or from the rectum, and to the high operation or the recto-vesical or lateral operation of lithotomy; next the structure of the scrotum and testes, tracing the course of the vasa deferentia to the sides of the urinary bladder; thirdly, the external nerves, blood-vessels, and muscles of the perineum, and particularly as they relate to lithotomy; fourthly, the component parts of the penis from the glans onwards to the urinary bladder, deliberately studying the relation of these and the contiguous parts to lithotomy, to stricture of the urethra and fistulæ in perineo; fifthly, the relation of the rectum to the prostate gland, urinary bladder, and *cul-de-sac* of the peritoneum, as regards the recto-vesical operation and the lateral operation of lithotomy, and also for puncturing the bladder; sixthly, let him trace the blood-vessels distributed to these organs within the pelvis, from the inferior mesenteric and from the internal iliac arteries; seventhly, let him detach the one-half of the pelvis, together with one of the extremities, as in Plate XIV. of Part III. (the left side is the preferable to remove), paying great attention at the time to the strength and course of the levator ani muscle while dividing it; he ought now to trace the vasa deferentia around the

are situated the urinary bladder and rectum, with the ureters, the vasa deferentia, the vesiculæ seminales, and the prostate gland, with various nerves, blood-vessels, lymphatics, and muscles. In the female pelvis there are the urinary bladder, the ureters, the rectum, the uterus with its appendages, the vagina, and several nerves, blood-vessels, lymphatics, and muscles.

The urinary bladder, marked m in Plates I. V. and VI. of Part II., in Plate XIV. of Part III., in Plate XIV. of Part X., and in Plates I. II. V. and VI. of Part XI., is situated in the pelvic cavity, close to the ossa

bladder to the vesiculæ seminales, and onwards to the prostate gland, and examine deliberately the relation of these organs to lithotomy and the different operations specified; lastly, let him remove, in a mass, the urinary bladder, rectum, and penis, dividing the vasa deferentia near the inguinal canals. Having removed these important organs, he should again examine their connexion and relation to each other, and then proceed to investigate minutely their structures, beginning with the urinary bladder; next, the urethra; thirdly, the vasa deferentia, the vesiculæ seminales, and prostate gland; fourthly, the corpora cavernosa, &c. Before beginning the examination of these viscera, the student should insert again and again the catheter or sound in the urethra, and feel along the urethra from the glans penis to the anus, and also introduce the fingers of his left hand into the anus. When exploring these viscera and organs in the female, a similar order should be pursued:—First, the inflections of the peritoneum are to be traced as they relate to the supporting of the uterus and its appendages, to puncturing the urinary bladder above the pubes, and to extirpating the uterus or ovaria; secondly, the nature, relations, and course of the external parts and the anus, examining carefully the relation of the clitoris to the meatus urinarius, the situation of the circulus membranosus, the os uteri, and the perineum; thirdly, the external nerves, blood-vessels, and muscles of the perineum; fourthly, the arteries and veins and nerves distributed to the urinary bladder, uterus, and rectum; fifthly, let him remove in a mass, the bladder, uterus, and rectum, examining, during their removal, the course of the levator ani, and the course of the blood-vessels and ureters. When these organs have been removed, he should investigate their relations and connexions more deliberately, and afterwards manipulate their minute structure. He should particularly attend to the structure of the clitoris, to the extent of the urethra, to the connexion between the urinary bladder and the vagina, to the extent and structure of the perineum, to the structure of the uterus and its appendages, and to the connexion between all of them.

pubis, supported by the peritoneum a, and loose cellular substance, by its anterior ligaments, by the umbilical arteries, which are ligamentous cords in the adult, and are marked *n* in Plate VI. and *Fig.* 6 of Plate II. of Part II., and by the urachus, seen also in this last mentioned figure; it is of a pyramidal figure, being longer than it is broad, the base pointing atlantad, and the apex to the outlet of the pelvis; a slight difference, however, exists between the male and the female, the shape of the latter being rounder or more spherical, and a degree larger; the base is termed the fundus, the middle portion its body, the apex or inferior part its cervix, and the commencement of the urethra its mouth; it consists of one partial and three entire tunics, the former being the peritoneum, and the latter a cellular, a muscular, and a mucous. The peritoneum in the male, as illustrated in Plates XIV. of Parts III. and X., and in Plate I. of Part XI., marked a, is reflected from the rectum I, to what is termed the fundus of the bladder, to which adhering, it extends towards the symphysis pubis A, where it leaves the bladder and invests the recti, pyramidales, and transverse muscles of the abdomen. In Plate I. of Part XI., the precise extent of adhesion of the peritoneum *a* to the bladder is delineated, particularly as relates to puncturing the bladder from the rectum, or performing the recto-vesical operation of lithotomy. The triangular space, marked D, adheres intimately and closely to the rectum, the cellular substance here being short, and admitting of no motion or separation of these viscera. In the female, the peritoneum *a* covers the same extent of the urinary bladder m, as in the male, as depicted in Plate V. of Part XI.; but the uterus k, and vagina D, intervening between the urinary bladder m, and the rectum I, the peritoneum a is reflected from the bladder m, on to the pubic aspect of the uterus k.

The urinary bladder, in the female, adheres intimately to the vagina D, on which it rests. The anterior ligaments are merely the fascia which invests the interior or pelvic surface of the levator ani muscle, and which leaving the muscle, ascends on each side of the body of the bladder, to which it adheres. At the arch of the pubes, a number of foramina are observable, which give passage to the veins of the penis. The foramina are termed the labyrinth. The umbilical arteries, described in page 34 of Part II., become ligamentous cords soon after birth, and from their adhering to the urinary bladder in their course from the internal iliac artery to the umbilicus, assist in supporting this organ. The urachus is a ligamentous cord which extends from the pubic aspect of the fundus of the urinary bladder, and is apparently a continuation of its muscular fibres, upwards, or sternad, between the recti muscles and between the latter and the peritoneum, and is lost near the umbilicus, occasionally advancing to this region.

In Plates II. and V. of Part XI., the cellular tunic, marked P, is partially displayed, being situated immediately beneath the peritoneal *a*. In Plate V. the portion marked P, is at no time covered by the peritoneum *a*. The cellular tunic encircles completely the urinary bladder, and is very loose, and loaded with adipose substance.

The muscular tunic, which is represented in Plates I. II. and VI. of Part XI., and in Plate XIV. of Part II., marked m, also entirely invests the urinary bladder, but is thicker and bolder in some places than in others; more so on its pubic, atlantal, sacral, and coccygeal, than on its lateral aspects. The fibres run in such a manner as to make it a very complicated task to unravel them; they consist of an external and an internal arrangement, the former, or external, which are the thicker and stronger,

run chiefly longitudinally from the pubic to the sacral, and from the sacral to the pubic aspects, mingling with each other on the fundus; the posterior arrangement also extend downwards to the neck, and afterwards ascend to meet and mingle with those on the pubic aspect. From this disposition of the longitudinal fibres, the sides of the bladder are almost entirely divested of them. The internal arrangement of muscular fibres are chiefly oblique, and run opposed to one another in such a manner, as to frequently enterlace with each other, and thus to thicken the muscular tunic. Around the neck of the bladder, they run nearly transversely and very close to each other, in order to form what is termed the sphincter of the bladder.* Some bundles of these fibres also encircle the termination of each ureter, and accompany them onwards to the mucous coat. Beneath or centrad to this internal arrangement of fibres, there are perceptible in several places, particularly on its rectal aspect, thin muscular fibres running longitudinally, or from cervix to fundus. When the bladder is fully distended, we can perceive the mucous coat between the fibres of the muscular, particularly on the sides of the viscus.†

The mucous tunic, marked Q in Plates II. and VI. of Part X., is situated within or centrad to the muscular, and is the last of its coats, being in contact with the urine in the living state. In Plates II. and VI. of Part XI. this coat is depicted, the urinary bladder being laid open. It is loose, and is furnished with delicate villi and mucous

* Syn. Musculus sphincter vesicæ urinariæ.

† The muscular tunic should be thoroughly understood by the general practitioner and the operator, to enable them to comprehend its powers with regard to retention of urine, and grasping calculi during the operation of lithotomy, also with regard to sacculating or encysting calculi, and to contraction and thickening from either calculi, diseased prostate gland, stricture of the urethra, or fistulæ in perineo.

glands, having a number of folds, apparently caused by the internal arrangement of muscular fibres, the latter of which are most numerous in the region of the neck of the bladder.*

Within the bladder there are three apertures, two of them, marked w* w*, being the entrance of the ureters, and the third, U, the mouth of the bladder, or beginning of the urethra.† In Plates II. and VI. of Part II., where the urinary bladder is represented laid open, and whale-bone probes, S, are inserted in the ureters w, w, the entrances or apertures of these ducts are delineated; and a small papillary eminence, w*, is observable, which, as already remarked, is partly formed by the internal muscular fibres of the bladder accompanying the ureter, and also partly by the union of the mucous tunic of the ureter with that of the urinary bladder. The space between the ureters w*, w*, and the commencement, U, of the urethra, is named trigonus Lieutaudi;‡ and by some authors a projection is described at the apex of this triangle, named the uvula vesicæ, or la luette.

From the termination of the ureters, onwards to the commencement of the urethra, two fleshy bundles extend, which are named the corpora carnea Morgagni.

The nerves and blood-vessels to the urinary bladder have been described in Part II.

I shall now describe the urethra of the male, and then the remaining organs of generation peculiar to this sex; and afterwards those of the female, as the organs of the one differ so materially from those of the other.

* The structure of the mucous tunic should be investigated to comprehend its diseases, as inflammation, suppuration, ulceration, catarrh, ischuria, hæmaturia, calculus, loose and encysted tubercles, scirrhus and cancer.

† Vesical orifice: Orificium vesicale.

‡ Syn. Trigone vésical.

In Plate II. of Part XI., the urethra, marked U, is delineated extending from the urinary bladder to the glans penis K, an extent of eight or nine inches in the adult. This is a cylindrical mucous tube, a continuation of the mucous tunic Q of the bladder, but much thinner in texture, very sensitive, highly vascular, and contractile; presenting a number of longitudinal folds in its collapsed state, and being of a reddish colour. Throughout its whole extent there are observable a number of mucous lacunæ, or small culs-de-sac, represented by small shaded spots, and which have thin apertures or mouths, pointing to the glans penis K. These are named the glands of Littre, or canaliculi Morgagni, and are said to be only found on the inferior aspect of the circumference of the urethra, which however is incorrect. They are more numerous near the glans than the bladder; and one of them, from its magnitude, is named lacuna magna. This mucous membranous tube, the urethra, is surrounded in its course in the penis by several objects which divide the canal into portions, and on which these objects confer appellations. Immediately as the urethra U commences, or even the neck of the bladder itself, it is surrounded by the prostate gland t, and this is named the prostatic portion of the urethra. The situation of this gland is also seen in Plate I. of this Part. As the urethra U advances, it is encompassed with dense strong spongy cellular substance E, together with the triangular ligament of the penis, marked M in Plate XIV. of Part X., and this is improperly termed the membranous portion.* Beyond the membranous portion E, Plate II., onwards to the glans penis K, the urethra is enveloped with the cor-

* This is unquestionably the toughest, and sometimes the hardest portion of the urethra, the ligamentous substance being frequently cartilaginous, so that the lithotomist should be prepared, on laying open the urethra at this part, to encounter strong tough hard substance, not delicate membrane, as the name would indicate.

pus spongiosum G; the bulbous portion of which is marked F, and the glans K, being merely enlargements of this spongy substance. The external aperture, or termination, or commencement of the urethra, marked H, is termed the meatus urinarius externus, or the orificium cutaneum, from the mucous membrane joining or becoming cutaneous.

Many authors have described most minutely the variations of the canal of the urethra in its different portions, but these seem much exaggerated, for in a healthy well formed penis, with the exception of the prostatic portion and the meatus externus, it is pretty equal in its diameter or calibre throughout. The calibre of this canal, like that of the pharynx and œsophagus, no doubt, differs in relative magnitude in individuals; but with the exception of the portions already mentioned, it will be found to be pretty equal throughout. It is described to be large where it is surrounded with the prostate gland; to be considerably contracted about an inch anterior to this, which is styled the isthmus urethræ, or membranous portion; to be dilated again where the corpus spongiosum begins to encircle it, or at the bulb; to be again contracted anterior to this, and to retain the same calibre onwards to the glans, where it becomes again dilated, and forms what is termed the fossa navicularis, the meatus urinarius itself being a little contracted. Other authors, as Amussat,* prove that there is no enlargement of the canal within the glans, that the diameter insensibly enlarges from the meatus externus to the bulb, where it contracts, and that it then slightly expands at the membranous portion, thus representing a cone, the base of which is towards the urinary bladder.

* Remarques sur l'Uretère de l'Homme et de la Femme, dans Archives Gén. de Médecine, tom. iv.

The urethra is very sensitive and elastic, both in its longitudinal and transverse direction.*

Where the prostate gland t, in Plates I. and II. of Part XI., surrounds the urethra U, there is a small projection seen in Plate II., marked T, which is named veru montanum,† and around this a number of smaller foramina, indicated by black dots, are perceivable. The latter foramina are the openings of the ducts of the prostate gland, and the veru montanum is the opening of the vasa deferentia.

The prostate gland t in Plates I. and II. of Part XI. is a conglobate gland of the size and shape of a chesnut, or of a triangle, being a little more than an inch in width, one in length, and half an inch in thickness, and weighing about five drachms, situated at the rectal aspect of the neck of the urinary bladder, and commencement of the urethra, both of which it nearly surrounds, but particularly the latter: it also gives lodgement to the vasa deferentia v. Its base is towards the urinary bladder, and its apex towards the membranous portion E of the urethra, with its body resting upon and adhering to the rectum. The prostate is a remarkably firm fleshy gland,‡ of a greyish red colour, surrounded with a strong fibrous membrane, having several excretory ducts, from eight to twelve in number, opening into the urethra by small follicular apertures

* The urethra is subject to acute specific inflammation, and increased vitiated mucous secretion, constituting gonorrhœa; to chronic inflammation with increased mucous secretion, constituting gleet; to spasmodic and permanent stricture; and to fistula. It is also occasionally malformed, the meatus opening at the inferior aspect of the urethra, sometimes in the perineum; the whole canal is at other times remarkably small in diameter, scarcely two lines in diameter throughout, a case of which I have at present under my care.

† Syn. Caput gallinaginis, vel gallinaceum: colliculus seminalis.

‡ The structure, particularly the consistence of the prostate gland, should be considered by the lithotomist, and if well understood he will never use a gorget.

around the veru montanum T, in Plate II., by piercing its mucous membrane.* Some authors describe a third lobe belonging to this gland, the two bulbous expansions on the sides of the neck of the bladder forming the other two lateral lobes; but this condition is only observable in the diseased state. This third or middle lobe, when present, is situated between the two lateral lobes, the urinary bladder and the veru montanum, projecting into the urethra or neck of the urinary bladder.†

The membranous portion of the urethra, marked E in Plates I. and II. of Part XI., is surrounded with strong, dense, spongy cellular substance, together with the triangular ligament of the penis,‡ the latter of which is marked M in Plate XIV. of Part X., and descends from the symphysis pubis A* to encircle and support this part of the canal.

The remainder of the urethra U is supported by the corpus spongiosum marked F, G, K, in Plates I. and II., the commencement of which is named the bulb F, and the termination the glans penis K. This spongy body, of considerable length, forming one of the three objects entering into the composition of the penis, being situated in the inferior fossa formed by the corpora cavernosa, is of a cellular structure, encased in condensed cellular substance, and swells out at its extremities; the cells when injected are found to be formed of a network of arteries and veins, the latter being the more numerous, and considerably dilated. The bulb F is merely an enlargement of this spongy cellular tissue, the calibre of the urinary

* The prostate gland is subject to inflammation and suppuration, to scrophulous enlargement, to many of the sarcomatous swellings, and to cancer; is concerned in puncturing the urinary bladder, and in the lateral and recto-vesical operation of lithotomy: calculi are sometimes sacculated in the prostate gland.

† This diseased projection into the urethra often becomes an obstacle to the introduction of the catheter.

‡ Syn. Interosseous ligament.

canal being in no degree increased; therefore the term bulb of the urethra is very liable to deceive us.* The glans K is of a round triangular shape, appearing cleft in two at its inferior aspect, having its apex terminating the member, where the meatus urinarius H is situated, and its base towards the body of the penis having an abrupt acute circular edge, which is termed the corona glandis. At the root of the glans, where the penis is less in diameter, or contracted, it is denominated the cervix. The glans is invested with a mucous membrane, which is continuous with that of the prepuce, marked L in Plate I. This membrane adheres intimately with the cellular web that invests the corpus spongiosum throughout.

The other two bodies which, with the corpus spongiosum urethræ G, constitute the penis, are the corpora cavernosa, marked X, X, in Plates I. and II. In the former of these plates the corpus cavernosum of the right side is seen extending from the crus ischii, to which it intimately adheres, onwards to the glans K; the precise origin is, strictly speaking, where the crus of the os ischii unites with that of the os pubis: the termination of the corpus cavernosum is more distinctly seen in Plate II. These corpora cavernosa advancing from the rami of the bones of the ischia, unite with each other at the bulb of the corpus spongiosum, forming by their junction a fossa situated on their inferior aspect for this latter object, and another on their superior aspect for the vena magna Galeni, and advance, forming the sides and upper part of the penis, onwards to the glans K; they are enveloped with a strong fibrous membrane, which dips between them, extending from the fossa that lodges the corpus spongiosum, to that on the upper aspect, which

* The precise situation of the bulb is in the perineum, between the root of the scrotum and the anus.

lodges the vena magna penis. This septum, named pectiniforme, is imperfect, in order to allow the blood-vessels to communicate with freedom, see Part III. page 103. These bodies are cellular, like the corpus spongiosum, as delineated in Plate II.; but the cells are rather larger, and consist almost entirely of dilated veins. The corpora cavernosa, together with the corpus spongiosum, are surrounded with the common integuments, which adhere by very loose cellular substance to these bodies,* there being no adipose substance. At the neck of the glans they become loose and pendulous, projecting forwards in order to form a covering for the glans, which is named the prepuce, and is marked L in Plate I. At the distal extremity of the prepuce a circular aperture is left, in order to allow the urine to be voided, and the glans to be denuded.† The surface towards the glans is mucous,‡ being formed by a reflected inversion of the cutis vera and epidermis, which extends along the cervix and body of the glans, to the meatus urinarius. The prepuce L is still further connected with the glans K by means of the frenum,§ marked N in Plate I., which is situated at the inferior aspect of the member, and consists of a perpendicular fold of the mucous membrane, which extends between the glans near the meatus urethræ to the prepuce, thus rendering this membrane tight in this region, but slack and pendulous

* The loose adhesion of these integuments should be investigated, to enable us to understand how the matter in chancres sometimes burrows between the skin and corpora cavernosa for a considerable extent.

† When the circular aperture of the prepuce is too small to permit the prepuce to be drawn behind the glans, a very common malformation, it is termed phymosis, and when with such a malformation, or from inflammation and thickening, the prepuce is pulled behind the glans and cannot be brought forwards, the affection is styled paraphymosis.

‡ This mucous structure of prepuce and glans should be considered with regard to spurious gonorrhœa.

§ Syn. Frenulum glandis.

above or on the upper aspect of the glans. On each side of the frenum N, and all around the neck of the glans K, and root of the prepuce L, are observable a number of small mucous glandular bodies, which are marked M in Plate I., and are termed glandulæ Tysonianæ.*

The integuments from the inguinal region, and the root of the penis, become loose and pendulous, of a brown colour, and at its anal aspect extending to the perineum, in order to form the scrotum marked Z in Plates XIV. and XV. of Part III., which is larger inferiorly, or at its most depending point, than at its origin, or upper aspect. This is a musculo-cutaneous pouch, containing the testes. The cutaneous part is very thin and delicate, although the epidermis is thick and solid, having a number of transverse circular rugæ, or wrinkles, running downwards from the root of the penis, to the central line which extends from the inferior aspect of the root of the penis, along the scrotum to the perineum, and even to the anus, which central or mesial line is a condensation of the integuments, and is named the raphe. A number of long stiff hairs grow from the scrotum, which are interspersed here and there, but which on the pubes are much more thickly set. A number of sebaceous glands are also distributed over the integuments of the scrotum.†

Centrad to or within the cutaneous pouch, an arrangement of circular muscular fibres are observable, named the dartos,‡ which are denied by some to possess muscularity. A multiplicity of small blood-vessels, particularly veins, are present, which give it a reddish appearance. Between the cutaneous and the muscular tunics a quantity

* These small glands become the seat of chancres.

† These glands become occasionally affected with primary syphilitic ulcer, and with that peculiar ulceration, named chimney-sweeper's cancer.

‡ Syn. Tunica carnea.

of delicate loose cellular substance without any adipose matter is found; and within the muscular layer, there is still more loose cellular tissue in immediate contact with the tunica vaginalis testis and root of the penis.* The cellular tissue which descends from the inguinal region and symphysis pubis, is thicker and stronger than that around the testis. This cellular tissue, together with the muscular fibres of the dartos, extends from opposite the raphe to the root of the penis, so as to divide the scrotum into two smaller pouches, which partition is named the mediastinum or septum scroti.

The testis,† marked b in Plate XV. of Part III., of an oblong roundish or oval figure, is contained in one of these smaller sacs of the scrotum z, being separated from the other testis by the mediastinum, and enveloped in its two tunics, the tunica vaginalis and the tunica albuginea, and also partially by the fibres of the cremaster muscle a, the latter of which, together with the spermatie cord, suspends this organ.

The cremaster muscle,‡ marked a in Plate XV. of Part III, and partly described in page 7 of the same Part, derives its origin from the internal oblique muscle, emerges at the external aperture of the inguinal canal, and descends on the spermatic cord, which it nearly encircles, downwards to the tunica vaginalis testis b, on which its fibres, becoming gradually more and more sepa-

* The cellular tissue here should be carefully considered with regard to the effusion of urine in fistula of the urethra, and calculi arrested here in their progress from the urinary bladder to the glans penis. The circumstance of the whole cellular tissue of the scrotum being easily inflated with air, or distended with fluids, is a strong argument in favour of the dartos not being muscular, and there being no muscular septum, yet we have only to consider the nature of a muscle, to reconcile this event to our minds.

† Syn. Didymus: Geminus. ‡ Syn. Tunica carnea seu erythroides.

rated, are lost, and thus answer the purpose of a tunic to the testis. Although the fibres of the cremaster nearly encircle the cord, they are much more distinct on its anterior aspect. The action of this muscle is to elevate the testis, particularly during coition.

Beneath or centrad to the fibres of the cremaster muscle, a loose cellular envelope surrounds the spermatic cord, which also binds or connects the vessels and duct composing this cord, and is named the immediate sheath of the spermatic cord. At its root we find this cellular envelope, forming a loose firm tunic for the testis, enclosing the body of the gland, its appendix or epididymis, and the root of the spermatic cord, and having an internal serous surface. It is named the tunica vaginalis testis,* is marked b in Plate XV. of Part III., and in Plate I. of Part XI., and adheres intimately to the posterior aspect of the testis and epididymis,† where it is reflected over the testis and epididymis, becoming very thin at this part, and hence, like the peritoneum, forms a perfect sac. It thus leaves a space for blood-vessels, ducts, &c. to enter and emerge from the testis. The exterior layer of the tunica vaginalis is strong and fibrous. That portion of this tunic which immediately invests the gland itself, has been named conjunctiva.‡ The tunica vaginalis communicates or mingles with the cellular envelope of the spermatic cord, and is not a production of the peritoneum, as is clearly and satisfactorily explained by Monro Primus, in the 5th vol. of the Medical Essays and Observations.

* Syn. Tunica vaginalis testis propria.

† This adhesion of the tunica vaginalis to the testis should be understood with regard to hydrocele, to enable us to comprehend the situation of the testis in this dropsical affection. The tunica vaginalis is also subject to ossification and to hæmatocele, resulting after the operation of tapping for hydrocele or castration.

‡ Syn. Tunica vaginalis reflexa: External lamina of the tunica albuginea.

Within the tunica vaginalis, or from its serous surface, a halitus or serous fluid is secreted.

The testis r, with its epididymis *r*, and root of the spermatic cord, is situated within the tunica vaginalis, marked b in Plate XV. of Part III., and Plate I. of Part XI. The testis r, of an oblong roundish, or oval figure, flattened in some degree, so as to have two sides and two edges, the posterior of the latter of which adheres to the tunica vaginalis, and gives entrance to the blood-vessels; also two extremities, an inferior and an upper, the latter of which gives rest to the epididymis, is invested with its proper tunic, named albuginea,* as represented in the section of the gland in Plate I. of Part XI. This immediately invests the glandular substance, is of a silvery colour, thick, and fibrous, being covered outwardly with the tunica vaginalis, and being pierced superiorly by the seminiferous ducts, and posteriorly by the spermatic vessels. Within the tunica albuginea, the gland of the testicle itself is contained, which consists of blood-vessels and seminiferous ducts arranged in lobules or fasciculi, separated from each other by very delicate cellular membranaceous septa,† extending longitudinally and divaricating from each other. These adhere in a concentrated bundle at the posterior edge of the testis, which is named corpus Highmorianum or nucleus‡ of the testicle, and from this they divaricate to the opposite edge, where they also adhere to the tunica albuginea. This subdivision of the testis into compartments, is attempted to be represented in the section of the gland in Plate I. of Part XI. The seminiferous ducts,§ separat-

* Syn. Tunica anonyma: Tunica fibrosa.

† Syn. Sepimenta: Septulæ.

‡ Syn. Firmamentum.

§ Syn. Vascula serpentina: Canaliculi seminales: Tubi vel tubuli seminiferi: Tubuli testis: Vasa recta: Vasa seminalia.

ed by these septa, are exceedingly small and convoluted (as represented in *Fig.* 2 of Plate II., where the letter v is placed on the concentration of them, there named vas deferens, and the letters Y on the membranous septa, the drawing being taken from a preparation wherein the vas deferens has been injected with mercury), running towards the corpus Highmorianum, and there uniting* and concentrating, and advancing to the superior extremity, where they still further reunite, become larger, and pierce the tunica albuginea to constitute the epididymis. From their commencement to their piercing the albuginea, they are estimated to be 5000 feet in length. In their course between the membranaceous septa, they do not inosculate. When we bisect a testis, we find it remarkably soft and delicate, of a brownish tinge, and on laying hold of any portion with the dissecting forceps, we elevate and elongate several of these delicate convoluted seminiferous ducts.

The epididymis,† marked *r* in Plate XVI. of Part III., and in Plate I. of Part XI., is that appendix to the testis situated on its upper and posterior extremity, resembling the capitol of a cucurbit. It is invested, in precisely the same manner, as the body of the testis, with the tunica vaginalis and albuginea, the latter of which is much thinner where it is interposed between it and the body of the testis. The lower margin of the epididymis hangs freely over, and around the upper extremity of the testis. The most elevated point of the epididymis is termed the globus major, or head of this appendix.

Where the seminiferous ducts pierce the tunica albuginea, and form the epididymis, they are much larger, as may be understood by examining *Fig.* 2 of Plate II. of Part XI.; they are about twenty in number, connected to-

* Syn. Rete testis.

† Syn. Testis accessorius: Tête du testicule.

gether by delicate cellular substance, and are termed vasa efferentia.* These concentrating form a flexuous tube, marked with the digit 1 in Plate XVI. of Part III., and with the letter v in Plate I. of Part XI., which descends along the posterior edge of the testis r, to its inferior extremity, where it assumes the name of vas deferens, and again ascends loosely connected to the testis, to its upper extremity, where it contributes to form a portion of the spermatic cord, along which it ascends posterior to the nervous and vascular plexus, to the inguinal canal, and enters the abdominal cavity.

Where the vasa efferentia of the epididymis have formed one duct, and are emerging from this appendix, the elongated conical portion is named its cauda.† The length of the ducts constituting the epididymis until it becomes the vas deferens, is calculated to measure about 30 feet.

A vas aberrans is described by some authors to pass off from the vas deferens, and terminate in a cul-de-sac; while another duct is described arising from the one end of the epididymis, and running into the other.

The vas deferens, marked v in Plate XIV. of Part III., in Plate XIV. of Part X., and Plate I. of Part XI., after its entrance into the abdominal cavity by the inguinal canal, proceeds dorsad of the peritoneum a, obliquely across the epigastric and the external iliac arteries, and the external iliac vein, and almost immediately separates at an acute angle from the nervous and vascular plexus g*, forming the rest of the spermatic cord, in order to enter the pelvic cavity, where it descends still exterior to the peritoneum, by the side of the body of the urinary bladder m, to which it adheres, running between the bladder and the ureter w,

* Syn. Vasa excretoria: Vascular cones.

† Syn. Globus minor.

down towards the cervix vesicæ, where it communicates with the vesicula seminalis u, and meets the duct v, of the opposite side, to pierce the substance of the prostate gland t, and the urethra U. The two vasa deferentia unite immediately before their termination at an acute angle, but do not communicate; they form the papilla named the veru montanum, which is marked T in *Fig.* 1 of Plate II. of Part XI. The vas deferens adheres to the peritoneum, until it runs between the ureter and the urinary bladder, but is exterior to it throughout its course, and only very partially covered by this membrane. Near where the vas deferens runs between the ureter and urinary bladder, it becomes a trifle larger, and continues so almost to its termination, when it again contracts, but does not increase in thickness.

The vas deferens is a canal remarkably small in its calibre, its two tunics being exceedingly thick, particularly the exterior, which is very hard and solid, and of a brownish yellow colour. Lewenhoeck perceived longitudinal fibres running along it, and Meckel has seen circular fibres. Its interior or central tunic, of a whitish colour, is much thinner, united to the exterior by loose cellular substance, and is continuous with the mucous membrane of the urethra.*

The vesicula seminalis,† marked u in Plates XIV. of Parts III. and X., and in Plate I. of Part XI., is a convoluted tube of an oblong oval shape, situated on the sacro-lateral aspect of the neck of the urinary bladder, enveloped with tough cellular substance, and interspersed with a profusion of veins, and apparently a continuation of the vas deferens. The peritoneum does not invest it,

* The vas deferens is subject to malformation, terminating in a cul-de-sac, and also to stricture.

† Syn. Paraprostatæ.

and it consists of the same tunics as the vas deferens, with this difference, that the mucous has a number of short loose folds projecting inwards, forming a cellular structure resembling the interior of the gall bladder. The vesicula seminalis communicates freely with the vas deferens, so as to be considered a continuation of it.*

That portion of the vas deferens which extends from the vesicula to the urethra, is named by some authors, ductus ejaculatorius. It has the same structure as the vesicula seminalis. The veru montanum, marked T in *Fig.* 1 of Plate II. of Part XI., is a small soft eminence formed by the mucous membrane of the urethra, in which the two vasa deferentia enter the urethra. When we use a blowpipe to this eminence, we inflate a small lacuna or pouch, formed by a loose floating circular membrane, which surrounds these openings of the ducts. The lacuna is named sinus pocularis, or sinus Morgagni.

The description of the nervous and vascular distributions to the male organs of generation have been partly given in Parts II. and III.

In page 105 of Part III., the spermatic artery is traced to its entering the testis at its posterior margin, where the tunica vaginalis begins to be reflected over the gland. The spermatic artery here pierces with several branches the tunica albuginea, both where this membrane envelopes the testis, as also the epididymis. It generally consists of two fasciculi of branches, the one larger and somewhat anterior, which is distributed to the testis itself; the other smaller and rather posterior, distributed to the epididymis. The fasciculis to the testis divides into still more minute ramifications, which run in a serpentine manner, and

* The vesiculæ seminales are sometimes deficient. They sometimes adhere to the neighbouring parts from inflammation, and are occasionally scirrhous. Calculi have been found in their tubes.

accompany the multiplied convolutions of the seminiferous ducts.

Within the glandular structure of the testicle, a still greater number of veins originate, which accompany the arteries, and emerge piercing the tunica albuginea; they then ascend along the spermatic cord, anterior to the vas deferens, concentrating and running in a convoluted manner, frequently crossing the arteries upwards to the inguinal canal, by which they enter the abdominal cavity, and accompany the spermatic artery, as described in page 25 of Part II. These spermatic veins, in their course along the cord, have numerous valves.* Where the spermatic veins emerge from the gland of the testis, they resemble the tendrils of a vine, and are named corpus pampiniforme, or corpus pyramidale, from their pyramidal appearance. The vascular plexus formed by the veins and arteries in their course along the cord, has also been termed vasa pampiniformia.

The formation of the spermatic plexus of nerves has been described in page 30 of Part II., and delineated in Plate 5 of the same Part, in which it is seen to accompany the artery *g*, to the ovarium. In the male it also accompanies the spermatic artery, with which it emerges at the inguinal canal, and descends along the spermatic cord, as represented in Plate XVI. of Part III., to the testicle, which it enters by the most minute filaments, together with the artery. In this course the spermatic plexus unites with the spermatic twig of the first lumbar nerve, marked with the digit 1, in Plate XV. of Part III., and also with filaments of the internal pudic nerve.

* The spermatic veins, as also those of the scrotum, particularly the former, are very subject to become varicose, constituting the disease named varicocele, or circocele. The spermatic cord is subject to dropsy, to scrophulous enlargement, to scirrhus, and to hæmatocele.

In the fetus in utero, prior to the sixth month of utero-gestation, the testis is situated partly in the renal and partly in the iliac region, dorsad to the peritoneum, immediately sacrad to the kidney, resting on the psoas magnus muscle, which satisfactorily accounts for the origin of the spermatic plexus of nerves, and the spermatic artery, and also the termination of the spermatic vein. Between the seventh and eighth months of utero-gestation, the testis begins to descend, behind or dorsad to the peritoneum, to the inguinal canal, where it emerges from the abdominal cavity, and descends into the scrotum, but without dragging down the peritoneum in its progress to form the tunica vaginalis, but only cellular substance, of which this tunic is formed, as has been already explained. In thus deviating from the description of modern authors, I am following Nature, and the clear simple account given by Monro Primus, in the 5th vol. of the Edinburgh Medical Essays and Observations. In the early period of the fetus, while the testis is in the abdomen, a ligamentous looking cord, of a triangular shape, named gubernaculum,* is reflected from the inguinal canal into the abdominal cavity, and attached by its base to the body of the testis. As the testis advances to the inguinal canal, this ligamentous cord becomes blended with the fibres of the cremaster muscle. †

* Syn. Vagina: Cylindrus: Basis.

† The testes are irregular in their descent from the abdominal cavity; sometimes they begin so early as the fifth month, sometimes the one descends before the other, while at others not until after birth, and occasionally never, one or both remaining in the abdomen for life. In some rare instances three testes have been found, two on the one side, and one on the other; an example of which I witnessed lately in a gentleman who consulted me about it, and who mistook it for hernia. The testicle is subject to many diseases, as, for example, inflammation constituting hernia humoralis, suppuration, fistulous or sinuous ulcers, scirrhus, cancer, scrophulous enlargement, cartilaginous enlargement, sarcomatous enlarge-

Two or three small glands, named after Cowper, are sometimes, but not always, found between the bulb of the urethra O, and the prostate gland t, as delineated in Plate XIV. of Part X., and one of which is marked N. When three are present, one is found on the one side of the urethra, and two on the other, and the anterior of the two latter is named the antiprostate gland. They are small conglomerate glands, of a round or oblong shape, and of a yellowish colour, enveloped in a strong cellular fascia, with long distinct ducts, which piercing the corpus spongiosum, enter the mucous membrane of the urethra.

I shall now proceed to the description of the muscles of the perineum in the male, which are delineated in Plate XIV. of Part III.

The accelerator urinæ* muscle, marked o in Plate XIV. of Part III., is situated beneath the integuments and a strong fascia, covering the proximal or perineal half of the corpus spongiosum urethræ. It derives a very delicate fleshy origin from the ramus of the os pubis, glides obliquely over the corpus cavernosum X, and the insertion of the erector penis p, from both of which objects it also either originates, or is attached for two or three inches downwards opposite the bulb of the urethra. The delicate fibres descend obliquely across the corpus spongiosum, and unite with those of the opposite muscle on the centre of this body, forming a delicate white tendinous line; the

ment, hydro-sarcocele, fungous excrescences, one of which is named lipoma, and to ossification. One or both are occasionally entirely wasted away. I had lately under my care a young gentleman affected with hernia humoralis, and one of whose testes is now scarcely the size of a horse bean.

* Syn. Primus penis musculus: Inferior sive urethram trahens: Musculus urethræ seu accelerator: Dilatator urethræ, sive accelerator seminis et urinæ: Urethram dilatans: Accelerator: Le bulbo-caverneux: Accelerator urinæ seu ejaculator seminis: Bulbo-urethral: Bulbo-syndesmo-caverneux.

muscles adhering in their course to the exterior cellular envelope of the corpus spongiosum, from their union superiorly down to the membranous portion. The inferior fibres unite also with those of the levator ani s, the transversus perinæi q, and the sphincter ani r muscles. The function of this muscle is to propel the urine or semen in their course along the urethra.*

The transversus perinæi† muscle, marked q in Plate XIV. of Part III., and situated between the tuberosity of the os ischium and bulb of the urethra, is sometimes single and sometimes double, more generally single. When double, as was the case in this subject, the deeper muscle to be immediately described, is named transversus perinæi alter. This muscle, marked q, is remarkably delicate, and sometimes consists of more than one fasciculus of carneous fibres, which derive their origin from the strong fascia covering the tuberosity of the os ischium G, and proceed either directly or obliquely across to the bond of union of these perineal fibres, those of this muscle mingling with the fibres of the accelerator urinæ o, the levator ani s, and the sphincter ani r muscles. The function of the transversi perinæi muscles is to keep the urethra and rectum, or anus, in the mesial plane, and to compress the urethra during the evacuation of the urine and

* When dissecting the accelerator urinæ muscle, the student must proceed with great caution, as it is very thin, and liable to be removed. He should make an oblique incision in the perineum, parallel with the fibres of the muscle near its middle, and proceed cautiously deeper and deeper, by removing the loose cellular substance, until he arrives at the condensed cellular envelope, which being also carefully removed, the fleshy fibres will be displayed, and are to be exposed by dissecting upwards and downwards, parallel with their arrangement.

† Syn. Levator ani parvus, seu externus: Transversus seu transversalis: Transversalis penis: Le dilatateur, qui part de la parte interieure de la tuberosité sciatique: Penis seu urethræ musculus transversus: Le transverse du periné: Ischio-perinéal: Ischio-pubi-prostatique.

seminal fluid; hence assisting the preceding muscles in their action.* This transversus perinæi is frequently deficient. The transversus perinæi alter† is much more generally found than the preceding. I may state, that I have never found it deficient. It is situated immediately deeper or centrad of the former, and is a stronger fasciculus of fibres, of a triangular shape, the base of which is towards the ramus of the os ischii, and the apex towards the bulb of the urethra, deriving its origin from the ramus of the os ischii, and extending directly across, with short fleshy fibres, which are inserted in the accelerator urinæ muscle o, opposite the bulb of the urethra. In Plate XIV. of Part III. this muscle should fill up the dark triangular space formed by the transversus perinæi q, the accelerator urinæ o, and the erector penis p muscles. Its function is the same as that of the preceding muscle.

The erector penis ‡ muscle, marked p in Plate XIV. of Part III., and situated along the ramus of the os ischium and os pubis, is a strong muscle, deriving its origin from the mesial aspect of the ramus of the os ischii, close to its tuberosity, and ascending along the ramus and corpus cavernosum penis, on the tendinous fascia of the latter of which its fibres are lost. This muscle sometimes originates with fleshy fibres, and at other times with tendinous ones; and sometimes its middle fibres are tendinous, and at others carneous; so that it

* In order to display the transversus perinæi muscle, a transverse incision of the integuments ought to be made from the region of the bulb of the urethra to the tuberosity of the os ischium, and the cellular tissue, which is very thready or fibrous here, should be carefully removed by incisions made parallel with that through the skin, or the fibres of the muscle.

† Syn. Urethræ elevator seu ejaculator: Ischio-prostatique.

‡ Syn. Tertius et quartus penis musculus: Posterior penis musculus: Erector: Collateralis, sive penem erigens: L'ischio-caverneux: Ischio-uréthral.

always presents a variegated appearance of alternate carneous and tendinous fibres. Its fibres nearly encircle the corpus cavernosum, and adhere to those of the accelerator urinæ muscle; and the terminating fibres on the corpus cavernosum run beneath those of the accelerator urinæ muscle. The function of this pair of muscles is to draw the corpora cavernosa backwards and downwards, or dorsad and sacrad, compressing them at the same time; and by the one muscle opposing the other in the lateral directions, they prevent these bodies from moving either dextrad or sinistrad. The action of these muscles is still more evident when the corpora cavernosa are distended, and these muscles may assist in their distension. *

The sphincter ani muscle, marked with the letters r in Plate XIV. of Part III., and situated around the anus I, is a delicate arrangement of scattered carneous fibres, which derive their origin from the apex of the os coccygis C, and run in an elliptical manner, on each side of the termination of the rectum I, or the anus, and are blended at the perineum with the fibres of the accelerator urinæ o, the transversus perinæi q, and the levator ani s, muscles. The fibres of this muscle are sometimes very pale and delicate, and interspersed with adipose substance, while at others they are strong, fleshy, and united to each other; occasionally they form a mass of considerable breadth surrounding the rectum, so much so, as to make some anatomists consider there are two sphincter muscles, an external and an internal.† The

* This muscle is readily discovered, and with facility displayed. The student should attend to the close connexion its fibres have with those of the accelerator urinæ, neither of whose fibres should be cut in the lateral operation of lithotomy.

† Synonyms of sphincter externus ani muscle. Musculus orbiculatim intestino obductus: Musculus orbicularis recti intestini, sphincter dictus: Sphincter pri-

function of the sphincter ani muscle is to keep the anus closed, until the desire to evacuate the feces overcomes it, when it then also assists in expelling them; and after their expulsion, it again acts as a janitor. This muscle likewise assists indirectly, through the medium of the levator ani, in propelling the urine along the urethra.*

The levator ani † muscle, marked s in Plate XIV. of Part III., and Plate I. of Part XI., is a circular or conical arrangement of strong carneous fibres, situated partly within and partly without the pelvic cavity, surrounding the neck of the bladder, and the termination of the rectum. It originates within the pelvis from the tendinous fascia, investing the obturatores interni muscles, the ligamentous fascia described in page 55, and from the central aspects of the symphysis pubis, and the os coccygis. From this circular origin, the fibres descend in a funnel-like shape, surrounding the neck of the bladder, the vesiculæ seminales, the prostate gland, the mem-

mus et externus, carnosus: Constrictor ani: Sphincter ani: Les sphincters cutanés: Pars per perinæum procurrens, videtur esse levator ani sextus gracilis et acuminatus: Est l'un des muscles dilatateurs de l'urethre: Urethræ dilatator posticus: Penis musculus triangularis: Urethræ virilis, dilatator posticus, sive triangularis: Coccygio-anal: Coccygio-cutané sphincter.

Synonyms of sphincter internus ani muscle. An est musculus cutaneus et circularis in extrema sedis ora collocatus: Sphincter cutaneus: Sphincter cutaneus ac superficialis: Sphincter internus: Le sphincter intestinal ou orbiculaire.

* The sphincter ani requires great care in its dissection, as its fibres are sometimes very pale and delicate. A slight semicircular incision should be made on each side, close to the verge of the anus, through the integuments, where they become the mucous membrane of the gut, and the fleshy fibres will appear, which are to be displayed by carefully dissecting in their course, and removing only the skin, for the fatty substance which generally lies between the fasciculi is liable to mislead the student. The sphincter ani muscle should be studied with regard to fistula in ano, and the recto-vesical operation of lithotomy.

† Syn. Musculus sedem attollens: Latus ani: Major levator ani: Levator: Levator magnus seu internus: Le releveur de l'anus: Sous-pubio-coccygien: Pubio-coccygien-annulaire.

branous portion of the urethra, and the termination of the rectum, to be inserted around the anus, the fibres running beneath those of the sphincter ani muscle r. The function of this muscle is to resist the peristaltic action of the intestines, particularly the rectum, until the desire to expel the feces calls it into action, when it then, in the first place, becomes quiescent; and, in the second, assists the rectum in their expulsion, by compressing it. This muscle also assists indirectly in expelling the urine, by pulling the sphincter ani upwards and forwards, or atlantad and sternad, which stretches the fibres of the acceleratores urinæ, and presses the bulb against the arch of the pubes, and shortens or contracts the membranous portion of the urethra. This muscle likewise aids indirectly the erectores penis, through the medium of the sphincter ani muscle, and assists in the expulsion of the seminal fluid, in the same manner as it does that of the urine, also by compressing the vesiculæ seminales.*

* The levator ani muscle is difficult to dissect, in consequence of its depth from the surface of the body. After the student has displayed the sphincter ani r, and the transversus perinæi q, muscles, he should remove with freedom a considerable portion of the adipose substance situated between the tuberosity of the os ischii and the rectum, proceeding cautiously near the latter, when he will perceive an arrangement of fleshy muscular fibres descending obliquely from within the pelvic cavity towards the anus. He must then dissect from the anus towards the pelvis, and dissect cleanly all the fibres of this muscle, which in fat subjects are generally interspersed with adipose substance. This is a muscle of great importance to the Lithotomist when performing the lateral operation, for until its fibres are freely divided, he cannot arrive at the membranous and prostatic portions of the urethra, or cut freely the neck of the urinary bladder. Still less can he extract a calculus of common magnitude, without tearing and lacerating its fibres. It is from bruising and lacerating and protracting this operation, that so many die of it. Free incisions do no harm; while small incisions lead to contusion, and laceration, and inflammation, with fatal results. Were operators daily occupied in dissection, few or none would die of this operation; but alas! how many surgeons belong to hospitals, who have never handled a scalpel on the dead body, either before or after their appointment. The great quantity of cellular and

ORGANS OF GENERATION

IN

THE FEMALE.

The organs of generation in the female are partly situated within the pelvis, and partly at the outlet of that cavity, and hence are divided, for the sake of simplicity and perspicuity, into the external parts or organs, and into the internal organs of generation; thus we observe a difference between those of the male and those of the female, the former being situated more without than within the pelvic cavity. These organs are delineated in Plates III. IV. V. and VI. of Part XI., and also in Plates I. V. and VI. of Part II.

The external organs, or those of copulation (organa copulationis), are the vagina, with its appendages, which are the mons veneris, the labia externa, the clitoris with its prepuce, the nymphæ, the meatus urinarius, and the hymen.

The hymen is considered the membrane which divides the external from the internal organs. Authors in their description of the external parts differ greatly in what are the limits of the vagina, some making the whole canal from the external aperture to the os uteri the vagina, which, in my opinion, is the simplest and most correct; while others define it to be that portion of the tube from the meatus urinarius to the os uteri; while others, again, only that part from the hymen to the os uteri.

adipose substances, in this triangular space, should be kept in view by the lithotomist, and by the practitioner, with regard to abscesses in this quarter, to fistula in ano, and in perinæo.

There can be no difference of opinion with respect to the function of these parts, although some authors consider that portion which is external to the hymen as only performing the function of copulation, while that internal to this membrane is regarded only as performing that of generation.

The mons veneris is that cushion of cellular and adipose substances, covered with the integuments, thickly studded with long thick hairs, situated on the symphysis and bodies of the bones of the pubes, and delineated in Plates III. and V. of Part XI., marked A. It is supported by a strong cellular prolongation or fascia, marked 70 in Plate IV. of Part XI., which is partly continuous with the fascia superficialis, and partly originating from the external oblique muscles, and may be named the ligamentum suspensorium, being analogous to that of the penis in the male.

The labia externa,* marked B in Plates III. IV. and V., are those large tumid oblong bodies which descend from the mons veneris A, on each side of the vagina D, downwards to the perineum E, thus meeting both superiorly and inferiorly, forming the entrance of the vagina,† and forming two acute angles, the upper of which is named the superior commissure,‡ marked c, and the lower the inferior commissure,§ marked d*, the latter of which has a delicate transverse fold within the vagina, which unites the two labia externa, and is named frenulum pudendi;|| and the space between this frenulum and the inferior commissure, which is exceedingly small, is termed fossa navicularis.

* Syn. Labia pudendi magna. Alæ pudendi majores.

† Syn. Vestibule; Vulva; Fossa magna. The vestibulum is defined by some authors to be formed by the nymphæ and prepuce.

‡ Syn. Commissura anterior.

§ Syn. Commissura posterior.

|| Syn. Furcula; Fourchette.

Some authors describe this fossa to be formed between the frenulum and the circulus membranosus L; indeed both the frenulum and this fossa are so indistinct, that they exist more in the mind of the anatomist than in nature. Each external labium B consists of the common integuments, which on their dermal or peripheral aspect are cutaneous, while on their mesial aspect they are mucous, the one structure running into the other. Within their cutaneous envelope a considerable quantity of cellular and adipose substances is found, and on the mucous surface a number of mucous follicles are observable.* The same aponeurotic web, marked 70 in Plate IV. of Part XI., which descends from the fascia superficialis and external oblique muscle to support the mons veneris, continues to run into the cellular tissue forming these bodies, in order to support them, and may be termed also ligamentum suspensorium labiorum externorum.

The space between the inferior commissure d* and the anus I** is named the perineum,† and is marked E in Plate III. of Part XI. This consists of the integuments, of the union of the sphincter vaginæ, N, and sphincter ani, r, muscles, together with cellular and adipose substances, as delineated in Plates III. and IV. of Part XI.‡ On

* The mucous surface of the labia externa is the seat of syphilitic ulcers and warty excrescences. The labia, when inflamed, sometimes shut up the vagina, and prevent the evacuation of the urine; and when attacked with phagedenic ulceration or hospital gangrene, they sphacelate with prodigious rapidity. They occasionally acquire a considerable magnitude from protracted leucorrhœa, or chronic inflammatory determination to them. In inguinal hernia, the viscera are liable to descend into the external labium. The labia externa are sometimes deficient, and are sometimes united together, forming an imperforated vagina; while occasionally the one is larger than the other.

† Syn. Perinæum anterius.

‡ The perineum is an object of much interest to the accoucheur, from its being very liable to be lacerated during parturition, unless supported during the efforts of nature at this period.

the surface of the integuments, a projecting line extends from the vagina to the anus, named the raphe, which is also indicated by the letter E in Plate III. of Part XI.

Immediately within or sacrad to the superior commissure c, the præputium clitoridis H is situated, which is a loose triangular elongation of the skin, that descends around and on each side of the glans clitoridis e, downwards to the nymphæ F, F, in a similar manner to the prepuce of the penis in the male. The prepuce is thin, soft, and moist on both its surfaces, particularly the internal, which is mucous; and a number of sebaceous glands* are situated in the angular fold formed between it and the glans clitoridis.

The glans clitoridis,† marked e in Plates III. IV. V. and VI. of Part XI., is the termination of the union of the two bodies, named crura clitoridis, one of which is delineated in Plates V. and VI., marked g. The situation of the clitoris, therefore, is immediately beneath, or sacrad, or coccygead, to the superior commissure c, or the arch of the pubes, and is surrounded with its prepuce H. It is an oblong round body, formed by these two crura g, each of which is attached to the point of union of the crura ischii et pubis, from which they ascend towards the arch of the pubes, where they unite at an obtuse angle to form this oblong body, that protrudes peripherad, covered by its præputium H, and terminates at the glans e. The crura and body of the clitoris have a production of the fascia, common to the mons veneris and labia externa, expanded over them, which is named ligamentum suspensorium clitoridis.

* Syn. Glandulæ odoriferæ.

† Synonyms of the clitoris. Membrum muliebre. Coles femininum. Nympha. Mentula muliebris.

The crura clitoridis* g consist of a spongy structure, enveloped with a strong fibrous sheath, as delineated in Plates V. and VI., particularly in *Fig.* 2 of the latter. From the point where the two crura unite to form the body of the clitoris onwards to the glans, they, or it, is encircled with the same fibrous envelope, which also sends a cribriform partition perpendicularly across to divide the clitoris, precisely in the same manner as that of the corpora cavernosa penis. Where the body of the clitoris becomes as it were the glans, the latter can be separated from the former, being only held together by cellular substance, nerves, and blood-vessels; and the end of the body of the clitoris has a concave surface, which receives the glans. The glans consists of the same spongy texture as the crura, which in all of them is found to be formed by large veins, frequently anastomosing. The glans has no septum, and is invested with a thin mucous membrane, covered with a thick soft epidermis.†

The nymphæ, or labia interna,‡ marked F in Plates III. V. and VI., descend on each side of the vagina D, from the clitoris G to the inferior commissure, where they are blended together. They are thin loose prolongations of the mucous membrane of the vagina, of an oblong shape,

* Syn. Corpora cavernosa clitoridis: Corpora spongiosa clitoridis.

† The situation of the clitoris should be well understood by the practitioner, as it is the guide to the meatus urinarius or opening of the urethra, when drawing off the urine with the catheter in the living body. It is liable to become the subject of operation, from being morbidly enlarged or scirrhous; is subject to malformation, being then also so enlarged as occasionally to deceive the parents with regard to the sex of the child. It is this which constitutes hermaphrodism; and in this case the prepuce and glans are well formed, and there is a fissure at the extremity of the glans. The malformation is easily ascertained by attentive examination.

‡ Syn. Labia pudendi minores: Alæ minores.

and reddish colour, somewhat similar to the wattles of the domestic cock. They consist of a very delicate spongy texture,* which is continuous with that of the glans clitoridis, but much finer, and enveloped with the mucous membrane of the vagina, the central surface being continuous with this, and the peripheral with that investing the external labium.† A number of sebaceous or mucous lacunæ are found on the nymphæ. In some, the nymphæ do not descend beyond the middle of the side of the vagina.

Centrad, or deeper in the vagina than the nymphæ F, F, and about an inch from the glans clitoridis G, under the arch of the pubes, the meatus urinarius K is situated.‡ The loose projection at its inferior or perineal aspect consists of a vascular spongy texture, and is named by some corpus glandulosum;§ and around the circumference of this orifice a number of mucous follicles are situated.|| The meatus urinarius K, is the outer aperture of the urethra, marked T in Plate V., and U in Plate VI. of Part XI., which is observed to be much shorter and wider in the female than in the male, being only about two inches in length, and a little more than a quarter of an inch in diameter. It extends from the meatus urinarius K, under the arch of the pubes A*, to the urinary bladder m; and consists, like that of the male, of a mu-

* Syn. Corpus cavernosum nymphæ.

† The nymphæ are found of very great magnitude in the race of the Boschismans, protruding beyond the external labia; and are also occasionally morbidly increased in size in Europeans. Sometimes they are deficient, and at others are found adhering, either from malformation or inflammation.

‡ The student should make himself master of the situation and structure of the meatus, together with the course of the urethra, in order to be able [illegible] urine with the catheter in the living body, when r[illegible]

§ Syn. Glandulæ prostatæ mulierum[illegible]

|| Syn. Prostata Barth[illegible]

cous tunic, marked u in Plate VI., with a spongy muscular tissue around.

Still deeper in the vagina than the meatus urinarius k, the circulus membranosus, or hymen,* marked l in Plate III. of Part XI., is situated, which is a circular or oval duplicature of the mucous membrane of the vagina, with an aperture in its centre; it is formed by an extension of that continuous with the mucous membrane of the nymphæ, and that continuous with the mucous membrane deeper than the hymen, united by cellular substance. This membranous circle is seldom complete, and its aperture is rarely in the middle, and always irregular. The broadest part of this membrane is generally towards the perineum. In the adult, particularly in the married female, instead of this membranous circle, there are merely short prolongations on each side of the vagina, as represented in Plates V. and VI. of Part XI., also marked l, and then named carunculæ myrtiformes. The circulus membranosus may be said to separate the external from the internal organs of generation,† and is considered by some authors to form the orificium vaginæ, the space between the external labia and the circulus membranosus being termed the vestibulum.‡ Between the meatus urinarius and the circulus membranosus, a number of mucous lacunæ are found extending around this portion of the canal.

The internal organs of generation or formation (organa generationis seu formantia,) are considered to be the re-

* Syn. Valvula vaginæ.

† The circulus membranosus is not unfrequently imperforated, in which case [it] is generally thicker and firmer, so that when the catamenia are secreted, they [illegible] in this [illegible] ix, and excite violent pain, so as to require this membrane to be [illegible] the extremity of the [illegible] prevented reuniting by sponge tent. [illegible] examination.

‡ Syn. Labia pudendi [illegible] the external labia to the circulus mem[illegible] [illegible] excrescences.

mainder of the vagina, with the uterus and its appendages; but this is more arbitrary than if the whole of the vagina is included under the external organs of copulation, and the uterus, with its appendages, made the organs of generation.

The continuation of the vagina D, is a circular or oval mucous tube, about four inches in length and one in diameter, situated between the urinary bladder m, and the rectum I, and running in the direction of the axis of the pelvis, beginning at the circulus membranosus L, and terminating in a cul-de-sac,* around the os uteri R, as delineated in Plates III. V. and VI. of Part XI. Its commencement at the circulus membranosus, which is the narrower of the two extremities, is named the orifice of the vagina.† The canal is more capacious at its upper or vesical region than at its lower or rectal region, and is longer in the latter or rectal than in the vesical direction. The vagina consists of two structures, an external, marked V in Plates V. and VI. of Part XI., which appears partly muscular and partly vascular; and an internal, marked D in the same plates, which is mucous, being only covered for a very small extent at its lower or sacral aspect, where it separates the uterus from the rectum by the peritoneum, as seen in *Fig.* 1 of Plate VI., the peritoneal membrane being marked *a*.‡ The external and internal layers or tunics are connected together with tolerable closeness; the external V is thick, solid, of a reddish colour, and appears continuous with the fibrous texture *b* of

* Syn. Fundus vaginæ.

† Syn. Aditus vaginæ: Os externum uteri. The orifice of the vagina is described by some to be that portion of the canal between the meatus urinarius and the circulus membranosus.

‡ Hernia sometimes takes place here between the uterus and the rectum, and the water in ascites makes a pouch occasionally, so as to enable it to be drawn off here.

the uterus. This external layer V adheres intimately to the urinary bladder ai, on its upper or pubic aspect, and also to the rectum l, on its sacral or coccygeal aspect, there being very little cellular tissue forming this bond of adhesion; and hence we may discard a cellular tunic as belonging to the vagina, described by some authors.* The internal or mucous tunic D, of a reddish colour in the living, but bluish white in the dead state, has a number of semicircular rugæ,† as delineated in Plates V. and VI., which run transversely across the direction of the canal, meeting with one another on each side at a longitudinal white line,‡ as represented in *Fig.* 1 of Plate VI. These transverse rugæ, most conspicuous in the *virgin*, and some of which are oblique, appear continuous with those in the cervix uteri, marked *c* in *Fig.* 1 of Plate VI.; and are largest and most numerous near the circulus membranosus, as delineated in Plate V. The mucous membrane of the vagina is continuous with that of the uterus. Throughout this mucous membrane, but particularly on its upper aspect, a number of mucous glands are situated, and between this mucous membrane D, and the external tissue V, a multiplicity of blood-vessels, especially veins, are found, some of which form a vascular plexus,§ near the circulus membranosus, as represented in *Fig.* 2 of Plate VI., marked *f*. The nervous and vascular distributions to these external organs have been described in Part II.‖

* The intimate adhesion of the vagina to the urinary bladder should be investigated when an incision for calculus in the bladder is required.

† Syn. Columnæ rugarum anterior et posterior.

‡ Syn. Raphe.

§ Syn. Plexus retiformis; Corpus cavernosum vaginæ.

‖ The vagina is sometimes so inflamed as to terminate in adhesion, and produce more or less contraction or stricture. It is occasionally involved in scirrhus uteri, and also in cancerous ulceration extending from that of the uterus, in which

The muscles which operate on these external organs of generation of the female, are the sphincteres vaginæ, the erectores clitoridis, the transversi perinæi, the levator ani, and sphincter ani; all of which are developed in Plate IV. of Part XI.

The sphincter vaginæ,* marked N in Plate IV. of Part XI., and situated exterior to the mucous membrane investing the external labium and contiguous portion of the vagina, is a broad fleshy muscle, which derives a scattered origin from the union of fibres belonging to the sphincter ani r, the transversus perinæi q, and the levator ani s muscles, and ascends on the side of the mucous membrane of the vagina, and is lost near the superior commissure c, on the ligament which supports the crura clitoridis, the fibres running under the ligamentum suspensorium labii externi 70, and over those of the erector clitoridis P. The function of this muscle is indicated by its name.

The erector clitoridis,† marked P in Plate IV. of Part

case it sometimes forms a communication either with the urinary bladder or the rectum. The vagina is also liable to be inverted or everted in prolapsus uteri. In a few instances, polypi have been found growing from the vagina, in the contiguity of the os uteri. The canal is occasionally malformed, being either very narrow in its transverse diameter, or very short in its length; sometimes it is imperforated, while at others it is deficient, there being nothing but loose cellular substance in its place, and on some rare occasions a double vagina has been found, there being a longitudinal septum extending from without to the os uteri, and even two hymens present.

* Syn. Orbicularis musculus sinum muliebrem undequaque obvolvens: Clitoridis inferior latus et planus: Portio carnosa in externa parte vaginæ: Alius musculorum paris, quod clitoridi a plerisque adscribitur: Vaginæ musculi constrictorii: Eadem sphincteris vaginæ: Constrictor cunni: The second muscle belonging to the clitoris: L'autre muscle du clitoris: Périnéo-clitorien: Anulo-syndesmo-clitorien.

† Syn. Clitoridis musculus: Clitoridis musculus tensioni dicatus: Superior rotundus: Musculus qui ab osse coxendicis oritur: The first muscle belonging to the clitoris: Ischio-caverneux: Ischio-sous-clitorien: Ischio-clitoridien.

XI., situated on the rami of the ossa ischii et pubis, derives its origin from the ramus of the os ischii, near its tuberosity, ascends on its ramus, and that of the os pubis, and the crus clitoridis, on which it is lost. Its function is to compress the crus of the clitoris, to draw it dorsad and sacrad, and thus facilitate the flow of blood into it; and by the one muscle opposing the other, they prevent the clitoris from moving to either side.

In Plate IV. of Part XI., we observe that the other muscles, the transversus perinæi q, and the transversus perinæi alter q*, the sphinter ani r, and the levator ani s,* have the same origin, course, and insertion, as in the male, which are described in page 74 of this Part.

The levator ani descends on each side of the vagina, so as to embrace it, and is partially inserted in its inferior extremity. The transversus perinæi alter q* is inserted in the labium externum and sphincter vaginæ. These muscles of the female, like those of the male, require considerable care in their dissection, in consequence of their delicate structure. As their delineation is very distinct in Plate IV., where the skin marked M is also left, in order to show the manner in which they should be dissected, it seems unnecessary to describe them further.

The proper organs of generation are the uterus and its appendages, the latter of which are the two round ligaments of the uterus, the two broad ligaments, the Fallopian tubes, the corpora fimbriata, the ovaria, and the ligaments of the ovaria.

The uterus,† marked k, in Plates I. V. VI. of Part II., and in Plates V. and VI. of Part XI., is situated in the pelvic cavity, between the urinary bladder m and the rec-

* The levator ani in the female should be carefully examined by the accoucheur, as it is concerned in parturition.

† Syn. Matrix. Womb.

tum k, and kept in this situation by the two broad, b, b, and the two round, l, l, ligaments. It is of a pyramidal figure, about two inches in length in the virgin, resembling a small flask or caoutchouk bottle, a little flattened on its pubic and sacral aspects, having a fundus k, a body p, a cervix c*, and an os n, as represented in *Fig.* 1 of Plate VI. of Part XI. It consists of a peritoneal investment, a, a fibrous structure b, and a mucous lining p, as delineated in the same figure.

The peritoneal tunic or investment of the uterus forms also the broad and round ligaments, and all these run so much into one another, that I shall describe them at once. The peritoneum a in Plate V. of Part XI. is observed expanded over the fundus of the bladder m, and to glide between its posterior or sacral aspect, and the anterior or pubic aspect of the uterus k, where it ascends to the fundus of the uterus, spreading out into loose folds on each side, marked l. After the peritoneum has arrived at the fundus k of the uterus, and the round looking cord k*, k*, which are the Fallopian tubes, it begins to descend in a similar manner on the sacral aspect of the uterus k, and these broad expansions b, b, as delineated in *Fig.* 1 of Plate VI. of Part XI.,† downwards between the cervix uteri and the rectum d*, on the latter of which it ascends, and spreads around the sides of the pelvis. In Plate VI. of Part XI. the peritoneum a is observed to extend between the rectum and uterus, even a little beyond or peripheral to the os uteri, so as to invest a very small portion of this sacral aspect of the vagina n q.‡ The fold of the peritoneum

* Syn. Collum uteri.

† In *Fig.* 1 of Plate VI. of Part XI. the uterus k, with its broad ligaments, are turned round, so as to give a full view of their sacral or posterior aspects.

‡ The prolongation of the peritoneum beyond or peripheral of the os uteri should be kept in view in extirpation of the uterus.

which extends upwards on each side from this point, and is lost on the sides of the pelvic cavity, is named, as already mentioned in page 32, plica semilunaris.* On the pubic or anterior aspect of the uterus, the peritoneum does not extend so far between the bladder and uterus, beyond or peripherad of the os uteri, but is reflected from the one viscus to the other, within half an inch of the os uteri in the adult.† This duplicature of the peritoneum is named by some authors, ligamentum uteri inferius anterius.

The broad ligaments of the uterus,‡ marked *k*, *k*, in Plates V. and VI. of Part XI., I have already described to be formed by a union of the anterior and posterior peritoneal investments of the uterus, extended transversely towards the sides of th pelvic cavity, so as to divide the pelvis into two halves, as illustrated in Plate V. This division, however, is only apparent when these ligaments are thrown on the stretch, by elevating the fundus uteri. These two laminæ

* Syn. Ligamentum uteri inferius posterius.

† The simple division of the peritoneum, where it forms an angle or fold between the urinary bladder and uterus, enables the scalpel to be carried around the os uteri in extirpation of the uterus. The uterus is sometimes absent, and at other times only one of its sides is present; occasionally, it is exceedingly small in size, with very thin parietes; a few instances have occurred where it has been divided into two lateral halves, and even where it has been divided by a longitudinal partition, so as to constitute two uteri, which partition has also in one or two cases extended to the external parts. It is subject to prolapsus, to retroversion, to inversion, to hernia, to laceration in the pregnant state, to inflammation, suppuration, ulceration, and obliteration; to polypi, which grow from its mucous membrane, investing either the fundus, body, or neck; to scirrhus and cancer, to sarcomatous tumours growing from its surface, to hypertrophy, to conversion into a fibro-cartilaginous mass, to ossification, or deposition of calcareous matter in its muscular texture, to a deposition of fat and hairs in its texture, to a deposition of teeth on its internal surface, and in its cavity. Scirrhus and cancer more frequently commence at the os and cervix than elsewhere, and the os is also subject to warty excrescences.

‡ Syn. Ligamenta lateralia uteri: Ala vespertilionum.

of the peritoneum are intimately connected by cellular substance, and admit of no aperture, with the exception of the ovarian one *k*** of the Fallopian tube. Besides the cellular tissue connecting these laminæ of the peritoneum which form the broad ligament, it is stated by some authors that there are muscular fibres which originate from the sides of the uterus, and extend outwards, becoming gradually lost as they extend between these layers of the peritoneum. There are several arteries, veins, and nerves running between these laminæ, as described in Part II. Each of those broad ligaments *k*, in its extension from the side and fundus of the uterus, embraces the Fallopian tube, marked *k**, the corpus fimbriatum s, a production apparently of the peritoneum, the ovarium x, with its ligamentous cord *n*, and the round ligament *l*.

The round ligaments,* marked *l*, also two in number, extend from the fundus k of the uterus to the inguinal canal, as delineated in Plates I. and V. of Part XI. Each round ligament is involved in the peritoneal envelope, forming the broad ligament, and consists of the peritoneum, investing a tissue of blood-vessels and cellular substance, extending from the fundus uteri to the inguinal region. This round ligament proceeds from the fundus uteri exterior or sacrad to the peritoneum, ascends to the side of the pelvis, crosses obliquely the external iliac vein and artery, and like the spermatic cord in the male, emerges from the abdomen on the iliac and atlantal aspect of the epigastric artery at the inguinal canal, and exterior in the inguinal region, divides into several fasciculi, which are lost in the adipose substance of the mons veneris and external labium.† See Plates I. and V. Part II. Besides

* Syn. Ligamentum uteri teres.

† The practitioner should carefully attend to this vascular connexion between

the blood-vessels and cellular tissue which enter into the formation of the round ligament, it is supposed there are longitudinal muscular fibres, which originate from the muscular substance of the uterus. The peritoneum does not surround entirely the round ligament, but merely invests it in the same manner as it does any of the small intestines, as, for example, the jejunum. When the uterus, together with its ligaments, is insulated, the round ligament is very partially covered with the peritoneum, and is with difficulty distinguished. Having described these productions of the peritoneum, I shall return to the description of the uterus.

I have mentioned that all the uterus, with the exception of its mouth, is invested with the peritoneum. The os uteri R projects into the fundus or upper opening of the vagina, and is surrounded by the latter; it consists of two swollen projecting labia, about an inch in extent in the virgin, arranged transversely with a horizontal aperture, and from its resemblance to the mouth of the ray or skate, is named also os tincæ.* The cervix is nearly cylindrical, and narrower than the os, being about six-eighths of an inch in diameter. The corpus or body swells out from the cervix, being about an inch and a half in breadth, and flattened on the pubic and sacral aspects, more so on the former than the latter, and having round edges or sides, and altogether a triangular appearance. The fundus is slightly arched.

Beneath or centrad to the peritoneal investment, there is the thick fleshy stratum, marked *b* in *Fig.* 1 of Plate VI., nearly half an inch thick at the body of the uterus.

the groin and the uterus, in reference to the application of leeches in suppression of the catamenia, and in hysteritis.

* Syn. Os uterinum: Orificium uteri externum.

This consists of several longitudinal muscular strata of a brownish red colour, between which are transverse or circular whitish bands, all intimately interlaced, and between which a number of extremely flexuous blood-vessels run, frequently inosculating together. The longitudinal fibres run from the fundus on the pubic and sacral aspects towards the cervix, where they disappear, some of them taking an oblique, and some even a transverse direction. The transverse fibres run in a circular direction, intimately interlacing with the longitudinal and oblique. The muscular substance is thickest at the fundus, there being very little at the cervix.

The internal aspect or cavity of the uterus, which corresponds somewhat in shape with the external, is lined with a reddish flocculent mucous membrane, marked *y* in *Fig. 1* of Plate VI., which communicates with the vagina through the medium of the os uteri, and with the peritoneum by the Fallopian tubes. This mucous tunic adheres intimately to the muscular or fibrous substance, and can be only separated by maceration; hence some authors have denied its existence, and considered there are only exhalant vessels situated here. At the cervix there are two longitudinal projecting lines on the pubic and sacral aspects, the former of which is represented in *Fig. 1* of Plate VI. of Part XI.; and from these, oblique lines with corresponding furrows extend upwards on each side towards the sides of the cervix. In this cervical region there is also a number of mucous glands or follicles,* situated chiefly on the inferior part.

The internal cavity of the uterus is extremely small, the pubic and sacral sides nearly touching each other; it communicates with the vagina by its mouth, which is rather

* [illegible] Ovula Nabothiana. [illegible]

larger than its cervix, and the latter of which becomes even narrower towards the body, where it is named ostium uteri internum. From this contraction the cavity swells out laterad, but not pubic and sacrad, to the fundus, where it extends to the commencement of the Fallopian tubes, the same mucous structure running along them. At the fundus, and especially where the Fallopian tubes begin, the parietes of the uterus are thinnest. The cavity of the uterus, where it begins to form these tubes, has a funnel-like shape.

The Fallopian tubes,* marked *k** in Plates V. and VI. of Part XI., form the highest or most atlantal free margins of the broad ligaments k, in which they are enveloped, and extend from the fundus uteri laterad towards the ovaria, N, N; they are flexuous tubes, between three and five inches long, small in calibre, but having thick fleshy parietes; and I have already mentioned, that they are encircled with the peritoneum, which forms at their ovarian extremities, in conjunction with their internal or mucous tunic, the elegant fringed web marked s, named corpus fimbriatum,† which surrounds the ovarian aperture *k***. Beneath or centrad to the peritoneal investment there is a layer of longitudinal muscular fibres, within which are also circular ones; and interior to this muscular layer is the mucous coat, arranged in longitudinal folds, extending from the corner of the fundus uteri to the corpus fimbriatum, the latter of which, as above mentioned, it contributes to form. The calibre of the Fallopian tube is exceedingly small at the uterus, being about half a line, and scarcely capable of admitting a hog's bristle; but from this it gradually enlarges towards its ovarian aper-

* Syn. Meatus seminarii.

† Syn. Morsus diaboli: Pavillon de la trompe: Morceau frangé.

ture,* so as to admit the common brass blow-pipe of the dissecting case, which is about four lines in diameter. The aperture at the fundus uteri is termed ostium uterinum.†

The ovarium,‡ marked *x* in Plate V. of Part II., and in Plates V. and VI. of Part XI., is an oval-shaped glandular-looking body, situated on the posterior or sacral aspect of the broad ligament *k* of the uterus, being also held in this situation by a ligament proper to itself, marked *u* in Plates V. and VI. of Part XI., and named ligamentum ovarii.§ This ligament *u*, is a production or duplicature of the peritoneum, together with cellular substance, which extends from the fundus uteri to the one extremity of the ovarium *x*. The ovarium is invested with a peritoneal envelope, continuous with the posterior or sacral lamina of the broad ligament of the uterus; it is about an inch and a half long, and about half an inch in diameter, being nearly of the same breadth and thickness; and its inferior or coccygeal margin is described as being more straight than the superior or atlantal, and having a slight concavity.‖

Beneath its peritoneal investment there is a white fibrous membrane, named tunica albuginea, both of which are intimately adherent; and this white tunic is pierced at the lower border of the ovarium with the blood-vessels which go to and from this body. On making a section of the ovarium *x**, as delineated in *Fig.* 1 of Plate VI. of Part XI., we perceive a number of vesicles, which

* Syn. Ostium abdominale.

† The uterine aperture of the Fallopian tube is sometimes obliterated, calculous concretions are occasionally found in the Fallopian tube; and a fœtus is sometimes developed in it, constituting a tubal conception.

‡ Syn. Testis muliebris.

§ Syn. Ligamentum rotundum ovarii.

‖ Syn. Hilus. Sinus vascularis.

vary from eight to twenty in number, imbedded in a brownish red substance, tolerably solid and firm, and plentifully supplied with blood-vessels.

The vesicles of the ovarium* vary in size, the largest being about three lines in diameter, and they are found more abundant on the surface than in the centre of the ovarium. They consist of a clear limpid fluid, encased in a thin serous membrane, which adheres to the substance of the ovarium.†

The nerves and blood-vessels to the female organs of generation are described in Part II.

* Syn. Ovula Graafiana.

† The ovaria are subject both to misplacement and to disease; they are occasionally found at birth exterior to the inguinal canals, forming herniæ, in which case they are sometimes mistaken for testes; and if the clitoris be very large, with the urethra immediately at its root, and the vagina small or the sides adherent, the combination is liable to be considered hermaphrodism. The ovaria are sometimes very small, and sometimes one or both are deficient. The vesiculæ are occasionally absent. The ovaria are subject to inflammation, suppuration, and ulceration, to hypertrophy, dropsy, an albuminous collection, sarcoma in all its forms, a deposition of teeth and hairs, and to ovarian conception.

INDEX

OF

THE LETTERS OF REFERENCE

IN

PART XI.

MALE AND FEMALE ORGANS OF GENERATION.

PLATE I.

A, Symphysis pubis
B, Section of os sacrum
C, Os coccygis
D, Triangular space of urinary bladder, formed by vasa deferentia and peritoneum
E, Membranous portion of urethra
F, Bulb of urethra
G, Corpus spongiosum urethræ
H, Meatus urinarius
I, Rectum
K, Glans penis
L, Prepuce
M, Sebaceous glands on prepuce and glans
N, Frenum
O, Spermatic vein
R, Rectus muscle
X, Corpus cavernosum penis
Z, Scrotum

h, Tunica vaginalis testis
m, Muscular tunic of urinary bladder
r, Body of testis
s, Levator ani muscle
t, Prostate gland
u, Vesiculæ seminales
v, Vas deferens
w, Ureter

o, Peritoneal coat of urinary bladder
g, Spermatic artery
y, Epididymis

PLATE II. *Fig.* 1.

E, Membranous portion of urethra
F, Bulb of the urethra laid open
G, Corpus spongiosum urethræ
K, Glans penis
K*, Glans penis laid open
M, Muscular coat of urinary bladder
P, Cellular tunic of urinary bladder
Q, Mucous coat of urinary bladder
S, Probe inserted in ureter
U, Urethra

h, Meatus urinarius
t, Prostate gland laid open
t, Caput galinaginis
w, Ureter
w*, Entrance of ureter in urinary bladder
x, Corpus cavernosum penis laid open

Fig. 2.

Y, Membranous septa of testis
v, Vas deferens

PLATE III.

A, Mons veneris
B, Labium externum
C, Superior commissure of vagina
D, Vagina
D*, Inferior commissure of vagina
E, Perineum
F, Nymphæ
G, Glans clitoridis
H, Preputium clitoridis
I, Anus
K, Meatus urinarius
L, Hymen

d, Vagina

PLATE IV.

E, External labium
G, Glans clitoridis
H, Preputium clitoridis
I*, Anus

PLATE IV. (*Continued.*)

M, The skin held out by hooks
N, Sphincter vaginæ muscle
O, Fascia lata
Y, Gluteus maximus muscle

p, Erector clitoridis muscle
q, Transversus perinæi muscle
q*, Transversus perinæi alter muscle
r, Sphincter ani muscle
s, Levator ani muscle

70, Ligamentum suspensorium labiorum

PLATE V.

A, Mons veneris
A*, Symphysis pubis
B, Labium externum
C, Superior commissure
D, Mucous tunic of vagina
F, Nymphæ
G, Glans clitoridis
I, Rectum
I*, Anus
K, Meatus urinarius
L, Carunculæ myrtiformes
N, Ovarium
P, Cellular tunic of the urinary bladder
R, Os uteri
S, Corpus fimbriatum
T, Corpus spongiosum urethræ
V, Spongy structure of vagina

b*, Sacro-iliac synchondrosis
g, Crus clitoridis
k, Fundus uteri
k**, Ovarian aperture of Fallopian tube
l, Round ligament of uterus
m, Fundus of urinary bladder
r, Sphincter ani
w, Ureter

a, Peritoneum
k, Broad ligament of uterus
*k**, Fallopian tube
n, Proper ligament of ovarium
z, Sigmoid flexure of colon

PLATE VI. *Fig.* 1.

A, Mons veneris
B, Labium externum
C, Superior commissure of vagina

PLATE VI. *(Continued.)*

D, Mucous tunic of vagina
D*, Inferior commissure of vagina
E, Perineum
F, Nymphæ
G, Glans clitoridis
H, Preputium clitoridis
I, Rectum
I*, Rectum
I**, Anus
K, Meatus urinarius
L, Carunculæ myrtiformes
N, Ovarium
N*, Ovarium laid open
P, Cellular tunic of urinary bladder
Q, Mucous tunic of urinary bladder
R, Os uteri
S, Corpus fimbriatum
S*, Whale-bone probe inserted in ureter
U, Urethra
V, Spongy structure of vagina

g, Crus clitoridis
k, Fundus uteri
m, Muscular tunic of urinary bladder

a, Peritoneum
b, Fleshy structure of uterus
e, Transverse lines of cervix uteri
g, Longitudinal ridge of cervix uteri
k, Broad ligament of uterus
*k**, Fallopian tube
*k***, Ovarian aperture of Fallopian tube
n, Proper ligament of ovarium
p, Mucous tunic of uterus

Fig. 2.

B, External labium
G, Glans clitoridis
H, Preputium clitoridis

g, Crus clitoridis

d, External aspect of mucous tunic of vagina
f, Vascular plexus of vagina

ERRATA AND OMISSIONS.

In page 15, continuation of the foot note, after abdominal viscera, *read*, The omentum majus is subject to inflammation, suppuration, induration, ossification, hydatids, and sarcomatous tumours. Adhesions between this web and the peritoneum investing the anterior parietes of the abdomen not unfrequently result, and bridle the intestines in such a manner as to produce internal ventral hernia. Adhesions also take place between the omentum and the small intestines.

In page 22, 9th line from the top, *for* page 15, *read* page 16.
In page 24, 6th line from the top, *for* page 15, *read* page 16.
In page 26, 16th line from the top, *for* in pages 15, *read* in pages 16.
In page 27, 10th line from the top, *for* in page 16, *read* in page 17.
In page 32, 3d line from the top, *for* page 16, *read* page 17.
In page 34, end of 2d foot note, after cancer, *read*, Hemorrhoids also occur here.